Stephen S. Sedgwick Esq

from the

Am. Institute

Oct 15/59

TRANSACTIONS

OF THE

AMERICAN INSTITUTE,

OF THE

CITY OF NEW-YORK,

FOR THE YEAR

1857.

ALBANY:
CHARLES VAN BENTHUYSEN.
1858.

Transport. Transfer to S. J. Stagg 1.12.70

AMERICAN INSTITUTE.

Trustees and Committees for 1857 and 1858.

1857.

President—ROBERT L. PELL.

Vice-Presidents—WM. HALL, EDWIN SMITH, BENJ. AYCRIGG.

Recording Secretary—HENRY MEIGS.

Corresponding Secretary and Agent—WM. B. LEONARD.

Treasurer—EDWARD T. BACKHOUSE.

Finance Committee—

John A. Bunting,	B. Lewis, Jr.,	S. R. Comstock.
N. G. Bradford,	John M. Reed,	

Managers of the Fair—Term of office one year:

Peter B. Mead,	B. J. Hathaway,	†WM. H. Butler,
Samuel D. Backus,	D. R. Jaques,	Chas. Turner.
*Wm. H. Adee,	Henry Steele,	

Term of office two years:

W. H. Dikeman,	Geo. F. Nesbitt,	Chas. A. Whitney,
B. Lewis, Jr.,	John F. Conrey,	Wm. Ebbitt.
John Gray,	John A. Bunting,	

Term of office three years:

F. W. Geissenhainer, Jr.,	Alfred Bridgeman,	C. V. Anderson,
John V. Brower,	Thos. W. Field,	Richard M. Hoe.
Thomas F. DeVoe,	Geo. Timpson,	

Committee on Agriculture—

Lewis G. Morris,	Nicholas Wyckoff,	Jas. J. Mapes.
Robert S. Livingston,	Wm. Lawton,	

Committee on Commerce—

Abraham Turnure,	Wm. H. Slocum,	John Disturnell.
Luther B. Wyman,	John P. Veeder,	

Committee on Manufactures, Science and Arts—

James Renwick,	S. D. Tillman,	Lewis Feuchtwanger.
John D. Ward,	Joseph Dixon,	

Committee on the Admission of Members—

Robert Lovett,	James F. Hall,	Henry Meigs.
Hiram Dixon,	John W. Chambers,	

Committee on Correspondence—

Alanson Nash,	Wm. H. Adee,	Joseph C. Pinckney.
Ralph Lockwood,	James Timpson,	

Committee on the Library—

Wm. Hibbard,	Ralph Lockwood,	Wm. H. Browne.
D. Meredith Reese,	D. R. Jaques,	

Committee on Repository—

Wm. B. Leonard,	Thomas Godwin,	Martin E. Thompson.
Archibald Johnson,	Jacob C. Parsons,	

Clerk and Secretary of the Trustees—John W. Chambers.

Librarian—E. A. Harris.

* In place of J. N. Wells, Jr., resigned.

† In place of James R. Smith, resigned.

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David R. Jaques,
Charles Turner,
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James C. Baldwin,
Wm. Sewell.

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R. L. Waterbury.

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STATE OF NEW YORK.

No. 164.

IN ASSEMBLY, MAR. 31, 1858.

TRANSACTIONS

Of the American Institute for the year 1857.

New-York, *March* 24, 1858.

To the Hon. Thomas G. Alvord, *Speaker of the Assembly*:

I herewith transmit the Annual Report of the American Institute of the city of New-York, for the year 1857.

Very respectfully,

Your obedient servant,

W. B. LEONARD,

Corresponding Secretary.

SIXTEENTH ANNUAL REPORT

OF THE TRUSTEES OF THE AMERICAN INSTITUTE.

The undersigned trustees, in conformity with the law of May 5, 1841, present a report of the acts of the Institute for the year 1857:

The progress of improvement in all the various branches of National industry was fully illustrated in the exhibition held at the Crystal Palace during the months of September and October last.

The rare productions of the soil and genius of our artisans, manufacturers and inventors, were gathered from nearly every State of the Union, and the exhibition surpassed in extent and variety of articles any previous Fair held by the Institute, and greater number of novel inventions than were ever collected in this country.

The great staples of agriculture, manufactures and the arts, were abundant and of superior quality, and were a conclusive demonstration of the vast benefit these yearly gatherings are to the community.

The samples of cereals and other productions of the soil, especially in the choice fruits and flowers, were the admiration of thousands of visitors, and the collection of vegetables were large and of unusually good quality.

Mechanical instruments, for agricultural and horticultural purposes, were of great variety and novelty, carrying conviction to every beholder that the toil of our ancestors in acquiring the necessary food and comforts of life has been much reduced by labor saving machinery, the product of the inventive genius of our own country.

It was determined to change the location for the cattle show, which has been held usually three or four miles from the city. These exhibitions of stock have become so general throughout

the country, that the cattle shows in the vicinity of New-York have been regarded with less interest than formerly. The committee, therefore, determined to invite growers of fat cattle and small stock to exhibit in the large arcade connected with the Palace, where were collected specimens of animals of immense size and weight, together with the celebrated flock of China or Nankin sheep exhibited by Robert L. Pell, Esq. They were of large size, some weighing two hundred and sixty pounds, the wool being of medium quality, but of strong fibre; the average fleece will be eight or nine pounds. The most remarkable property connected with them is that they breed three times in fifteen months, producing four, five, and even six, at a birth. One ewe at the Palace had four lambs by her side.

A herd of Lamas, seventy-two in number, were also exhibited, just imported from South America. These appear to be hardy animals, and will no doubt attract the attention of farmers.

Universal interest was manifested in the machine department, as also in the extensive display of hardware, cutlery, dry goods, printing presses, nautical instruments, specimens of naval architecture and building materials in wood, iron, and stone, which filled a large space. Carriages of every description; castings of all the different metals for all varieties of purposes, with the great display of sewing machines and other numerous articles, as set forth in the list of premiums.

Information gathered at these repositories of the sciences and arts, aided by the Farmers' and Mechanics' Clubs, becomes diffused through all branches of society, the benefit of which can only be estimated by the rapid improvements in every section of our country.

In regard to the vast amount of gratuitous labor rendered by the officers of the American Institute, in promoting this great work, we trust the fostering hand of our State and city governments will not be withheld in providing a suitable repository for the operations of this Institute.

In the Crystal Palace might be collected and put in operation a school of science and art, from which seekers of knowledge in

all branches of industry, from every part of our country, might acquire information connected with their professions unattainable from any other source.

Respectfully submitted,

ROBERT L. PELL, EDWIN SWITH,
WM. HALL, HENRY MEIGS,
B. AYCRIGG, W. B. LEONARD,
E. T. BACKHOUSE.

NEW-YORK, *March* 23, 1858.

FINANCES.

The following is the financial condition of the American Institute, on the first day of February, 1858:

Balance in the treasury, February 1, 1857,		$7,194 50
The RECEIPTS of the year have been—		
From rent of store, &c., No. 351 Broadway, from Nov. 1, 1856, to Nov. 1, 1857,	$3,500 00	
From Treasurer of State of New-York, under act of May, 1841,	950 00	
From Managers of the 28th Annual Fair, balance,	248 36	
From balance in bank, reserved for premiums,	170 70	
From Managers of the 29th Annual Fair,	2,595 92	
From Commissioners of Emigration, for building at Castle Garden,	520 00	
From sales of four chandeliers,	40 00	
From admission fees and annual dues,	2,259 00	
From certificates of award,	40 00	
From sales of Transactions,	2 00	
From library fines, 1856 and 1857,	12 25	
From trustees, Crystal Palace account balance,	33 63	
		10,371 86
		$17,566 36
Less $5 counterfeit bill,		5 00
Carried forward,		$17,561 36

Brought forward,			$17,561 36

Payments.

Real Estate.			
Interest on mortgage, $13,000, Nov. 1, 1856, to Nov. 1, 1857,	$845 00		
Taxes 1857,	871 60		
Water tax 1857,	14 95		
Insurance,	140 50		
Repairs of roof, &c.,	60 40		
		$1,932 45	
Library Committee.			
Books,	$372 80		
Periodicals,	144 48		
Binding books,	97 40		
Subscription to newspapers,	112 50		
Printing and binding catalogues of library,	320 97		
Advertising notice of library,	14 40		
Baize for cov'g library tables,	18 94		
		1,081 49	
Portrait of T. B. Wakeman.			
Painting likeness and framing,		184 00	
Account of 27th Annual Fair, 1855.			
Gas pipes and repairs,	$45 00		
ooks for premiums,	5 25		
		50 25	
Account of 28th Annual Fair, 1856.			
Medals for premiums,	$107 63		
Repairs of Montgomery boiler,	71 63		
Advertising cattle show,	266 05		
Evergreens,	21 50		
		466 81	
Account of the 29th Annual Fair, 1857.			
Cash paid Managers, per resolution of the Institute,		1,000 00	
Suit with Commissioners of Emigration.			
Counsel fees, &c., and referees' fees,		276 00	
Carried forward,		$4,991 00	$17,561 36

Brought forward,			$4,991 00	$17,561 36
Crystal Palace.				
Six months' rent of the Crystal Palace, at $550 per month,			$3,300 00	
Miscellaneous Bills.				
Ins. on library and fixtures,		$42 50		
Printing by-laws and blanks,		107 25		
Bl'k books, paper & envelopes		83 58		
Advertising,		80 50		
Coal,		81 75		
Gas light,		54 45		
Agent's expenses at Albany,		74 75		
Agent's traveling expenses,		108 52		
Freight of Transactions,		22 70		
Repairs & alter'ns of furnace,		58 00		
Repairs of water pipes, windows of store and stoves,		20 34		
Repairs of settees and chairs, and painting,		32 00		
Painting, brushes, &c., varnishing cases,		26 82		
Carpenters' work,		13 65		
Sign for Mechanics' Club,		2 00		
Directory,		2 50		
Preparing Mss. for Trans.,		10 00		
Professional services,		10 50		
Ice,		12 31		
Petty cash—postages, advertising in small papers, cleaning, &c., &c.,		376 28		
			1,220 40	
Salaries.				
Agent,		1,541 48		
Recording Sec'y,	$929 16			
As Sec'y of Farmers' Club,	62 50			
		991 66		
Carried forward,		$2,533 14	$4,520 40	$17,561 36

Brought forward,	$2,533 14	$4,550 40	$17,561 36
Clerk,	$1,300 00		
Librarian,	923 24		
Boy,	264 50		
		5,020 88	
Total expenditures,			14,542 28
Balance in the treasury Feb. 1, 1858,			$3,019 08

AMOUNT OF PROPERTY HELD BY THE INSTITUTE, JANUARY 30, 1858.

Real estate, No. 351 Broadway, cost,	$45,000 00	
Building 89½ Leonard st.,	800 00	
	$45,800 00	
Less mortgage,	13,000 00	
		32,800 00
Library and fixtures, per report made to the Institute Jan. 30, 1858,		12,387 85
Office furniture, safes, &c.,		350 00
Other property, at the Crystal Palace:		
Steam boilers and fixtures,	$2,200 00	
Shafting, pullies, steam and gas pipes,	1,000 00	
Brake and dynamometer,	280 00	
Steam gauge, (Allen's,)	25 00	
Timber, tables, benches and trucks,	500 00	
		4,005 00
Cash in treasury Jan. 30, 1858,		3,019 08
Nineteen gold and 75 silver medals, and 7 silver cups on hand, paid for by Managers of the 29th Fair, and not used, valued at,		784 00
Total,		$53,345 93

JOHN A. BUNTING,
BENEDICT LEWIS, Jr.,
JOHN M REED,
S. R. COMSTOCK,
N. G. BRADFORD.
Finance Committee.

NEW-YORK, *January* 30, 1858.

REPORT.

Of the Board of Managers of the Twenty-ninth Annual Fair of the American Institute.

The Board of Managers of the Twenty-Ninth Annual Fair of the American Institute, respectfully

REPORT:

That on the 29th day of May last, they were duly organized by the election of Charles A. Whitney, as chairman, and F. W. Geissenhainer, Jr., vice-chairman, and by appointing John W. Chambers, as secretary.

The members of the Board, on entering upon their duties, felt the full measure of the responsibility resting upon them. To call forth, to arrange and combine the various offerings of labor, of genius, of production, and of art, with all their various and multiform accompaniments, with inventions improved or newly born from the brain of American workmen, required, and it is hoped, received due attention from the Board.

Our Institution, so long the nursery of the noble monuments of American genius and labor, requires its Annual Fair, to give life to its members, as well as a new and lasting impulse to inventors and exhibiters; and its continued success must, in no small degree, depend on its character for just appreciation, and upon an intelligent discrimination in the bestowal of its rewards and premiums. Let its decisions be just and liberal, and the seal of the Institute will be acknowledged before every tribunal of labor throughout the civilized world.

By a prudent forecast on the part of the trustees, the Crystal Palace was secured in the month of June. This enabled the board

to commence their labors at a somewhat earlier period than was usual in past years, by informing the manufacturers, agriculturists, mechanics and others, that the Crystal Palace, itself a noble structure of art, would be open in due time to receive their offerings. Not only were circulars sent throughout the country, but our very efficient agent, Mr. Leonard, traveled through a number of States, and everywhere meeting the hearty response which gave ample assurance of a successful exhibition.

Among the new preliminary labors, the Board of Managers caused to be erected a chimney stack sixty feet in height. The boilers belonging to the Institute were removed from Castle Garden, and lengthened to thirty-six feet each, thoroughly repaired, and substantially set in the machine arcade; an entirely new line of shafting, with hangers and pulleys, were procured, together with numerous articles, costing in the aggregate about the sum of $3,500, which belong to the Institute. The board were induced to incur this apparently large expense, upon the suggestion of the committee on machinery, for the reasons more fully set forth in their report, which is hereunto annexed. These improvements, though somewhat expensive, gave us a greatly enlarged power, and afforded to exhibitors a wider range in the exhibition for the display of their various ingenious labor-saving inventions, and they will all be useful in like manner, should the Institution hold its future fairs in the Crystal Palace.

The Fair was opened to the public about two weeks earlier than on former occasions; while this was intended to prevent the Fair from extending too far into the month of November, it proved, from other causes, to have been most fortunate. It will be seen, by the daily receipts, a statement of which is hereunto annexed, that the exhibition had continued for three weeks, with a success and promise without parallel in any past season. City and country contributed daily and nightly, increasing throngs of intelligent and deeply interested spectators.

It was at this period, while in the course of a brilliant success, the public mind was paralyzed by a commercial shock, as sudden as it was disastrous and unexpected. No interests escaped, no one

felt secure. The city ceased to do business with the country, and the country ceased to visit the city; and yet, amid this convulsion, too recent and severe in the memories of all to need description, the Fair continued, and closed finally not only free from loss, but with a certain gain, thus demonstrating, under the severest adverses, the firm hold the Fair of the Institute has on the public at large.

The managers take great pleasure in alluding to the courtesy extended by the various railroad and steamboat companies, for the facilities offered in bringing and returning heavy articles exhibited at the Fair.

The opening address was delivered by the Recording Secretary, Hon. Henry Meigs; and the anniversary address was delivered in the Crystal Palace on the evening of the 27th of October, by the Honorable Nathaniel P. Banks, Jr., of Massachusetts, which was listened to with great attention by a numerous auditory.

During the exhibition, eighty-seven propositions were received from gentlemen wishing to become members of the Institute, four of whom paid for life-membership, making the receipts from this source $495. There was also received from members for dues $828, making a total of $1,323.

The arrangement of the Horticultural Department of the late Fair, of which Mr. A. Bridgman was chairman, gave great satisfaction, both to the exhibiters and visitors. Three distinct lists of prizes were offered, to meet the great length of time our Fairs are held; and although the premiums in this department are somewhat increased, the benefit of which was amply realized by the choice specimens on exhibition.

A new feature was this year introduced, of awarding premiums of increased value for the cereals and standard grass-seeds of our country, the successful competitors presenting to the Institute the samples exhibited, which will be put up in bags with the name and residence of the grower; the premium awarded, to be distributed at the Farmer's Club of the Institute. These choice speci-

mens of seed, like bread cast upon the waters, will be returned in increased quantities into the graneries of our farmers.

The Smithfield Fat Cattle Show, held in London, is visited by the leading farmers and breeders of the country, who have an opportunity to compare the various methods adopted to bring animals to such great perfection, and the exhibition is crowded with visitors during its continuance. It was deemed advisable to introduce this feature in our Fairs, viz., a Fat Cattle Show, during the month of December, for at this season of the year breeders and feeders have their choice cattle ready for sale, and the city of New-York being a market to which this class of animals are usually sent, it was thought that a show at the Palace would be a nucleus from which great future benefits would be derived.

The premium committee, of which Mr. John A. Bunting was chairman, faithfully performed the duties assigned them; competent and impartial judges were appointed to examine the various articles offered for competition. The following contains a list of the premiums, predicated upon the reports of the judges, which have been approved by the managers, viz:

1	large gold medal.
14	gold medals.
35	gold medals, certified.
41	large silver medals.
149	silver medals.
47	silver medals, certified.
38	silver cups, (value $467.)
147	bronze medals.
377	diplomas.
72	volumes of books.

A great part of the above premiums have been prepared, and the balance are in course of preparation.

The following is a condensed statement of the Receipts and Expenditures of the Twenty-ninth Annual Fair at the Crystal Palace:

RECEIPTS.

September 14, 1857. Cash from the Treasurer of the American Institute, (per resolution,)		$1,000 00
Sales of Tickets.		
Tuesday, September	15,	160 00
Wednesday, "	16,	190 00
Thursday, "	17,	212 00
Friday, "	18,	310 00
Saturday, "	19,	143 00
Monday, "	21,	425 00
Tuesday, "	22,	635 00
Wednesday, "	23,	750 00
Thursday, "	24,	780 00
Friday, "	25,	1,050 00
Saturday, "	26,	810 00
Monday, "	28,	745 00
Tuesday, "	29,	1,230 00
Wednesday, "	30,	1,081 00
Thursday, October	1,	800 00
Friday, "	2,	1,270 00
Saturday, "	3,	670 00
Monday, "	5,	710 00
Tuesday, "	6,	1,314 00
Wednesday, "	7,	834 00
Thursday, "	8,	886 00
Friday, "	9,	1,200 00
Saturday, "	10,	635 00
Monday, "	12,	452 00
Tuesday, "	13,	622 00
Wednesday, "	14,	306 00
Thursday, "	15,	190 00
Friday, "	16,	337 00
Carried forward,		$19,747 00

Brought forward,		$19,747 00
Saturday, October 17,		480 00
Monday, " 19,		400 00
Tuesday, " 20,		991 00
Wednesday, " 21,		354 00
Thursday, " 22,		352 00
Friday, " 23,		525 00
Saturday, " 24,		165 00
Monday, " 26, / Tuesday, " 27,		255 00
Wednesday, " 28,		280 00
Thursday, " 29,		200 00
Friday, " 30,		620 00
Saturday, " 31,		155 00
Monday, November 2,		230 00
Tuesday, " 3,		410 00
Wednesday, " 4,		270 00
Thursday, " 5,		350 00
Friday, " 6,		859 88
		$26,643 88

Sales of Tickets, Fat Cattle Show.

Tuesday, December 15, / Wednesday, " 16,	$132 00	
Thursday, " 17,	125 50	
		257 50
Rent of refreshment saloons,		1,500 00
15 cent tickets,		224 10
Stands,		77 00
Schools,		12 21
		$28,714 69
Less discount on uncurrent money,		47 86
		$28,666 83

EXPENDITURES.

By Printing and Publication Committee.

Printing circulars, tickets, blanks, posting bills, &c.,	$628 90	
Advertising,	1,544 66	
Carried forward,	$2,173 56	$28,666 83

Brought forward,	$2,173 56		$28,666 83
Bill posting,	43 80		
Muslin for bills and flags,	109 27		
Blank books, stationery, envelopes, &c.,	110 13		
Postage st'ps, U. S. & Boyd's,	99 02		
Badges, ribbon, stamping and making,	35 40		
Folding and dist'g circulars,	7 50		
		$2,578 98	
By Ticket Committee.			
Ticket receivers,	$236 00		
Gum elastic rings,	6 80		
		242 80	
By Finance Committee.			
Ticket sellers,		282 00	
By Police Committee.			
Detective police,	$132 00		
Day and night watch,	1,423 00		
Floor clerks,	883 50		
		2,438 50	
Machine Department.			
Lengthening boilers, &c.,	$1,666 28		
Mason work, build'g chimney, setting boilers, &c.,	284 14		
Bricks for do	149 63		
Iron work, shafting pullies, pipes, &c.,	901 86		
Use of boiler, eng's, shft'g, &c.,	505 64		
Belting, (leather and gutta percha,)	41 88		
Croton water,	47 00		
Coal,	916 50		
Lumber for shafting, &c.,	84 68		
Cartage,	10 00		
Friction wheel and steam indicator, for test of engines,	276 25		
Erect'g & run'g print'g press,	450 00		
Carried forward,	$5,333,86	$5,542 28	$28,666 83

Brought forward,	$5,333 86	$5,542 28	$28,666 83
Pay rolls, engineers, firemen, laborers, &c.,	1,614 23		
		6,948 09	
By Horticultural Committee.			
Clerks and assistants,	$520 50		
Use of crockery,	54 75		
Evergreens,	29 14		
Painting,	20 09		
Repairs of tin tubes,	4 04		
Expenses procuring flowers, sand, &c.,	12 95		
		641 46	
By Refreshment Committee.			
Refreshments for managers, judges, etc., while detailed on duty,		713 83	
By Light Committee.			
Gas,	$3,117 01		
Rep'g gas fixtures, pipes, new burners, torches, &c.,	393 97		
Lanterns,	9 50		
Alcohol and fluid,	15 85		
Rope to light chandelier,	10 92		
Lighting,	208 00		
		3,755 23	
By Music Committee.			
Instrumental music,	$2,214 00		
Vocal music,	50 00		
Use of Calliope,	110 00		
Rope for platform,	5 71		
		2,379 71	
Panorama of the Rhine.			
Lecturer, music and assistants,		508 25	
Desk Clerks.			
Entry clerks,		339 75	
Carried forward,		$20,828 60	$28,666 83

Brought forward,		$20,828 60	$28,666 83
By Flagg Committee.			
Flags, poles and mountings,	$18 00		
Ins. and cartage U. S. flags,	8 25		
Banner on Broadway,	10 00		
		36 25	
Laborers.			
Sweepers, getting in goods, &c.,		901 51	
Upholstering and Decorating.			
Muslin for covering tables, &c,	$207 78		
Baize for doors, &c.,	9 60		
Paper and labor decorating,	57 87		
		275 25	
Carpenters' Work and Lumber.			
Carpenters' work, mak'g tables and fitting up,	$403 61		
Lumber and hardware,	543 86		
		947 47	
By Premium Committee.			
Gold, silver & bronze medals,	1,694 79		
Silver ware and silver cups,	449 50		
Printing and paper for dip's,	136 08		
Medal cases,	124 00		
Books,	59 70		
Use of glass case to display premiums,	20 00		
		2,484 07	
Miscellaneous Bills.			
Cartage and freight,	$120 87		
Use of chairs for anniversary address,	7 50		
Hotel bill of orator,	69 43		
Suit of clothes for orator,	52 25		
Paint, oil, putty and glass, for repairs,	157 19		
Feed for animals, (fat cattle show),	56 40		
Carried forward,	$463 64	$25,473 15	$28,666 83

Brought forward,	$463 64	$25,473 15	$28,666 83
Hardware, brooms, brushes,	21 90		
Rep's of hose for fire hydrants,	9 25		
Water cooler,	5 50		
Taking charge of goods at entrance,	35 00		
Repairs of gate,	25 00		
Sundry disbursements,	37 47		
		597 76	
Total expenditure,			26,070 91
Leaving a balance of,			$2,595 92
Of which there has been paid into the treasury of the American Institute,			2,000 00
Which amount being deducted from the above, leaves			$595 92

This amount will be required to pay for premiums, the bills for which have not been audited.

Nineteen large gold medals, seventy-five large silver medals, and seven silver cups have not been used. They are valued at $784, which should be added to the surplus of the Fair.

Respectfully submitted,

CHARLES A. WHITNEY, *Chairman.*
F. W. GEISSENHAIMER, Jr., *Vice-Chairman.*

PETER B. MEAD,	GEORGE F. NESBITT,
SAMUEL D. BACKUS,	JOHN F. CONREY,
B. J. HATHAWAY,	JOHN A. BUNTING,
D. R. JAQUES,	WM. EBBITT,
HENRY STEELE,	JOHN V. BROWER,
CHAS. TURNER,	THOMAS F. DE VOE,
WM. H. BUTLER,	ALFRED BRIDGEMAN,
WM. H. ADEE,	THOMAS W. FIELD,
W. H. DIKEMAN,	GEORGE TIMSON,
B. LEWIS, Jr.,	C. V. ANDERSON,
JOHN GRAY,	RICHARD M. HOE,

WM. B. LEONARD, *Cor. Sec'y, ex officio.*

New-York, *January* 5, 1858. *Managers.*

Chas. A. Whitney, Esq., *Chairman Board of Managers, &c.:*

Dear Sir: Herewith I have the honor to report, that as far as my ability and circumstances would permit, I have carried out the orders of the Board of Managers in the general arrangement

of the motive power and other machinery, in order to give every facility possible to exhibiters of the late Annual Fair.

The Board resolved to avoid the dissatisfaction manifested by the exhibiters of the Twenty-seventh and Twenty-eighth Fairs, in consequence of the then temporary arrangements of steam boilers, and the frequent complaints of the Croton water board of sparks and cinders deposited in the reservoir from the smoke pipes through the roof; to obviate which, the boilers belonging to the Institute were removed from Castle Garden, lengthened to a more suitable size, and permanently set in brick, in connection with a brick smoke stack, erected through one of the towers; which silenced all complaints against sparks and cinders, and afforded sufficient power for the steam engines to drive all the machinery in the main building. A locomotive boiler having been engaged, was found to be more convenient to furnish the power for pumps, &c.

The machinery department was far superior and more satisfactory to exhibiters than any ever displayed in this building. The time for making such extensive preparations was so limited, as to make it necessary to drive the work at greater expense than would have been incurred under competition by contract, but gratifying to see so much solidity and perfection of motion in all our arrangements.

The Calliope and Panorama, I believe, were a source of profit exceeding the expense, and the Lightning printing press was an attractive feature. The subject of testing steam engines, was justly considered by the Board of great importance to the public, and that the merits of these machines and the improvements should be fully considered, judges were invited, from four States of the Union, to witness the trial of the closing week of the Fair, in October; but in consequence of the general depression in business, the Board extended the exhibition for two weeks, which deranged all the plans for making the trial, and at the close of the Fair it was announced to take place on the 15th of November, the first day of the Cattle Show, at which time the proprietors of the engines were present, with a new board of judges, assembled to make the trial, but the competitors objected to some of

them, and the difficulty of procuring substitutes at the moment, together with the unseasonable weather, rendered the trial out of the question. I would, therefore, recommend, as we have the necessary apparatus on hand, and the exhibiters still anxious for the test, that measures be taken to complete this important decision.

W. B. LEONARD, *Committee.*

OPENING ADDRESS,

AT THE TWENTY-NINTH ANNUAL FAIR OF THE AMERICAN INSTITUTE, SEPTEMBER 15TH, 1857.

By the Hon. HENRY MEIGS, *Recording Secretary.*

LADIES AND GENTLEMEN.—Welcome to this Crystal Palace now opened to the genius of America, whose millions of strong arms carry into the fullest perfection the designs and inventions of the freest people on earth, original, self-dependent, looking with eagle eye onward and upward. Behold the realities all around you—nearly every one of them made for useful purposes, the smaller number for ornament, and do not forget while you look, that all is the work of Americans, and chiefly of the one year past. Those are samples of American work in the factory and field; and their total value to our country, counting all crops and all works, about five thousand millions of dollars in one year; a sum which would pay that great pyramid of debt of Great Britain, whose base is all the people and on whose apex sits credit, the emperor of commerce.

And this almost fabulous sum of money, before which California and Australia hide their penny play, is due to modern science in agriculture, and especially to the mechanic arts, those steel-bound giants who do more travelling for us in a year than all the horses, mules, and camels of the world could do; aye, with all the men to help them. England said thirty days ago, that she is now fighting China and India, which constitute half the people of the whole globe, and that she would whip them too? That her science and machinery constituted a power more than equal to the task; for by mathematical calculation, she now has working powers equal to those of four hundred millions of able-

bodied men! whereas China and India have about two hundred and fifty millions only!

The old seven wonders of the world have lasted long enough; they are filed away on the top shelf. All of them combined do not equal the smallest of our modern wonders. So universal is our knowledge of this fact, that there are left "none so poor as to do them reverence." They with the other grand obsoletes, Jupiter & Co., poor Vulcan, prince of blacksmiths for ages, had credit enough to be admitted to the parlors of the gods, who, rowdy-like, roared with laughter as they saw the immortal blacksmith walk across the carpet, one leg being too short, giving him an up and down motion. *Po-ipnu-on*, as Homer says, nodding foot. Why, Vulcan would not be trusted to blow the bellows in any of our great iron works, which turn out in a day's work more than he could with all his help in a year, and better work too. And as to the rest of these gods, if those rowdies were here now a days, Venus would be committed to the penitentiary; Mercury, for cheating, to the Sing Sing prison; Mars, State prison for life; Juno, to the horse-pond for scolding; Cupid, to the House of Refuge; and Jupiter, put under the care of a receiver.

One hundred years ago an eccentric Englishman, being in Rome, viewed the statues. When he had examined that of Jupiter, he made him a low bow, hat off, saying, "Sir! you see I am polite to you in your adversity, I hope that you will remember it, if you ever get into power again."

There is a great sign in the Eastern heavens—all the hideous false gods of China and Hindostan are shaking their wooden heads and trembling on their feet of clay at the coming of the Bible and true science, with lightning for its messenger. Those monkeyisms of the last 4,000 years, their Juggernaut, Cremation, and all their horrid mummeries, which cannot endure the lights of Christianity and science, are about to be added to the mass of our old Western lumber, the gods of the Pantheon, for science is now putting the lightning band around the whole earth.

And all this is not more wonderful than that which is done this year, ending July 1, in England. For by our last statistics from London, we see that in those twelve months England has carried on her railways one hundred and forty millions of persons, and the distance one thousand millions of miles, nearly ten journeys from the earth to the sun, or a trip far longer than from this palace to the planet Saturn, and over once around the orbit of our earth.

Well may this age feel proud; but better yet, it should act up to its dignity. A grandeur of science and art has come among us which may make us justly feel like kings; but as these are gratuities from heaven, we must behave as becomes so favored a generation. It is a victory on which we, as our Perry and Mc Donough did for less matters, should give the glory to Almighty God.

True science stands the test of ages. The glorious works of Archimedes and Euclid, like the fixed stars, shine this day with the same everlasting brilliance. The more humble science of agriculture, in the hands of ancient Agronomes like Columella and others, are from age to age forgotten and then resumed! Now is the day of their revival! All sciences concur in the glorious work given to Adam and his children to till the earth; steam and lightning are harnessed to the work? Another generation will behold new miracles in man's farm and garden! How shall we be able to prove our gratitude to God?

Read his ten commandments and do them to the letter and the spirit!

Ladies and gentlemen—The object I keep before me is to set us all to more deep thinking upon this marvellous era.

Let us think for a moment what New-York city is to be? Ancient cities and even modern cities until now have been limited to a million or two of inhabitants. They could not be larger, for their supplies would not allow it. None of their old, slow, confined commerce, travel, culture, etc., could do it. They burned all the wood, they would not garden it well enough and wide

enough; cloth of all sorts became more and more dear; everything was limited. Now, suppose our adjacent country did not supply eggs! Steamers and railroads can bring them fresh a thousand miles and a million times more of them. *Fresh beef in ice cars* comes here from the far West, our peaches come several hundred miles, game fresh from our borders, ice goes a thousand miles to our hot regions. Our fresh milk comes over a hundred miles to breakfast. We ask a friend in New Orleans "How do you do?" and in two minutes you hear him, "Very well I thank ye." With such means we see no difficulty in the extension of New-York city, from Sandy Hook to the city of Hendrik Hudson, a hundred miles up this river with depth of water all the way for that other new wonder of the world, the *Leviathan!* Chemistry will have all the refuse material of such a metropolis, and return it all to the fields whence it originated, to double their fertility to all time! Then our Croton will be a plaything, while we drink the freshet of our great North river. Returning to farming! we foresee the greatest perfection of farming will surely come. Boydell of England, has lately succeeded to a valuable extent in ploughing and harrowing by steam. We shall be happy to be taught to plough, or dig, or harrow, or reap by England, or anybody else; but it is better that we should begin at home. It is an honest pride!

We believe that chemistry has not only already made millions for the farmers, but that it will ere long give all the fertilism wanted, superior to any now known. Guano may be exhausted, but the chemical powers to produce a better one never will be while man keeps that erect posture which he is beginning to have, as he casts his eyes upon the vast powers and privileges now bestowed upon him; realizing poor Ovid's "Os homini sublime dedit" as he wrote it at Odessa, on the Black Sea, 1800 years ago. It sounds well in his Latin, but I like it in English: "To man he gave a sublime countenance," etc.

The advancement of one art leads to another. Links of one grand chain! How could we lay a line across the stormy Atlantic, if Fulton's genius had not prepared the steamer and Franklin the principles of the telegraph?

Science moves *pari passu* with capital. The first thousand dollars, added one by one, was all that our princely merchant, John Jacob Astor required to begin his ten millions with.

Genius, here and there, like pearls or diamonds in the ocean or earth, was rarely found anywhere until this period, for—

> "Full many a gem of purest ray serene
> The dark unfathomed caves of ocean bear."

Gray said it best, you see.

This great republic, where all are free to think, has already shown such gems, and we look for a galaxy of them before 1900.

Ladies and gentlemen—It is as plain as the sun at noon-day, that we are bound by heavier obligations, than ever were laid upon any people since the flood, to watch our schools and colleges. Cost what it may, we must drive out from among us all ignorance. It must not be allowed any more than the yellow fever or cholera, to remain in our land if we can prevent it! Despots alone fear knowledge. Republics love it as their foun dation rock. So says every knowing man these thousands of years.

The American Institute has done as much as its power admitted, to promote, according to its charter, "agriculture, commerce, manufactures and the arts," and its mode of instruction has been to display every fall, to everybody, all the real evi dences of progress among us. These silent things, to a good observer, are all eloquent in their way, they often compel him to say to himself if not to another, I wonder how he did it! What could have led him to such a complicated novel contrivance? Many machines being as it were automatic vital machinery.

Among these automatons of wonderful powers, we cannot choose to omit the printing presses made by a member of this Institute, Mr. Hoe, whose working and immense results are a wonder in England, as well as here, and her great paper the London Times will be printed by it. One thing, we must be exceedingly cautious in using this engine, which when it prints such immoral,

unmanly trash as we have already seen, does more harm than the explosion of a magazine, or even a volcano.

The greater its power, the greater ought to be its purity. It should have always attached to it one of our most perfect smut machines, that the golden wheat of true knowledge may come out bright for domestic use, and that it may in our humble grain, the rye, take out all the poisonous ergot.

We understand that a great movement in our cotton crops is on hand in Alabama.

Henry's recent patent machine for use on the cotton plantation, gins the cotton on the spot and spins it into suitable yarns, thus saving that manufacturing profit to the cotton growers, beside greatly lessening the cost of transportation probably about one-half, and preventing losses by fire by being in the solid form of yarns.

We congratulate you on the rapid progress made by our countrymen in the fine arts. We rejoice in the noble evidence before us of the fact, that utilitarian as our young nation necessarily has been, we now use prosperity in the grand arts of painting, sculpture and architecture. The world already admires many of our works. More may be expected. We shall soon attract attention by superior excellence in this beautiful quarter of national wealth and fame. We already share with the old world her exquisite music; if we don't play as well as France and Italy, we love it, and pay well. The human ear cultivated finds luxury in music far beyond all other luxuries. And it is refinement in itself, and not only innocent but increasing, by its melody and harmony, the grand concords of religion and morality. No one is insensible to the strains of the Academy of Music or those of Trinity church.

Nothing wicked can either be melodious or harmonious.

Let Gray speak;

"Where through the long-drawn aisle and fretted vault,
The pealing anthem swells the note of praise."

Let Collins say a word in his Ode to the Passions:

"O Music! sphere-descended maid,
Friend of pleasure, wisdom's aid!"

"*And he that hath no music in his soul;*" we all know what he is fit for.

In a violent storm at sea, the passenger listens, shut up below, to the horrors of the gale for hours. At length they become less and less, and then what a balmy feeling enfolds his heart as the rude sailor on deck sings, "Cease rude Boreas, blustering railer!" The music lulls him to exquisite sleep. We say, give us music in the midst of our labors, at sea or on shore; give us the best too! Let every house have it.

We feel glad whenever we see an organ or a pianoforte, especially the modern, noble improved pianos. We look at every one as a missionary of civilization and good. An intelligent writer, you may know him, I have forgot, said in my day, "Let me make the music for a nation and I have them." What enormous power followed the great French hymn, the *Marseillaise;* still sounding in our ears from hand-organs in the street; sung by myriads in and out of France since 1794, when I first heard it sung by the officers and men of a French corvette in this harbor, sung only as madmen alone can sing.

Dibdin, the sea poet, has done as much for the navy of old "*England,*" as some of her heroes, Nelson perhaps excepted.

A cynical philosopher who had travelled much among rude nations (you recollect) said that he felt gratified at having arrived at last in a civilized country, for he had found a *gallows* standing near the town! How infinitely superior evidence of that would have been one of our charming pianos at the first house he entered?

What an immense stride has been caused by the electric fluid, in civilization? Franklin received the first flash of it since creation. He drew it down from heaven, and the American Morse set it to work. All nations are looking with almost breathless anxiety to hear in a second from each other by wire two miles deep and almost three thousand miles long by the ocean road

The question was before the Mechanics' Club of the American Institute several months ago, and an engineer by the name of Tillman, one of the club, doubted the success of the ocean route, because of the presumed mountainous inequalities of the ocean bottom which naturally must have mountains as well as the dry land, and because of currents, and the impossibility of access to the wires for the purpose of repair. The engineer proposed a route on land perfectly certain, as much so as any line of telegraph now in operation; that is, overland to Behring's Straits, thence over the old world. Distance is nothing, and here is positive certainty, for the sixty miles of Behring's Straits is nothing. A competent land force can guard the entire circuit.

Since the last fair, there has appeared from the East a new plant never before known in Europe or America, one which promises and will give sugar in superabundance to all the temperate latitudes, instead of being confined to the burning tropics. And besides the vast utility of it to man, it will be also of immense benefit to our animals. Horses and cattle thrive on a proper share of sugar. Those of our people who use many horses for laborious work, have discovered of late years that some sugar mixed with their food is of great value to their health and consequent strength—so that it is given to them even at the recent very high prices.

These new sugar-canes come from China and from Southern Africa, the latter, known by the name Imphee, is just introduced into the U. S. by Leonard Wray, of London. You all know that by the daring adventures of scientific botanists, (some five hundred of them,) in recent times, the nations of the world have exchanged some precious plants with each other—many thousands of useful and beautiful ones. Humboldt saw our primitive dahlia of single petals in Mexico, and assigned it a rank as a sunflower. The roots of it only were sought for as a new table potato. But it was soon determined to be utterly unfit to eat, and was dropped, flower and all. Not long afterwards, some double flowers being noticed, the dahlia was courted by gardeners, and by proper nursing has long enjoyed high distinction by its wonderful form and colors.

It has become a business of enlightened governments to increase and multiply for their people all the necessary and agreeable productions of all the world.

The Emperor of the French has established large societies for the use of France—they are under his personal care and protection—for the acclimation of all animals in France, if possible, including even the ostrich, with its nest of forty to sixty eggs. The home-breeding of fish has drawn great attention by its proud success. The waters of the lands and the oceans are being supplied with new ones, where the former races had disappeared. The President of the American Institute, R. L. Pell, has published highly valuable papers on that interesting subject—better than the European.

The whole powers of science and art are enlisted in vigorous efforts to improve agriculture, and they have already doubled the *feed power* of England in the last twelve years; that of Ireland in seven years; and quadrupled that of Germany in twenty years. Here, although wearing out our virgin soil heretofore, at the rapid rate with which *foolish heirs waste an estate*, we now have begun to *double* the *best crops* which that *virgin soil* ever gave. Those who know best the history of our agriculture, believe that science and art have been worth to us, in the last few years, more money than California yields—twice over every year. I have no doubt of that.

And to all this amelioration we know that the mechanic power of the Republic has contributed *a lion's share* in plows, cultivators, hoes, weeders, reapers, mowers, steam in every form—in fetching and carrying to market, grinding, etc.

And the end is yet far off. For it is now easy to see that barren places can be turned into paradise gardens and farms! The Emperor of the French has already destroyed the barren, gloomy Bois de Boulogne, where, among stinted trees and sand, the duelists from Paris manured it with its only manure—*their blood!*—and where now, by deep and abundant culture and manure, it presents the delightful face of a garden and meadows!

In Italy, too, the grand work of restoring trees to those rocks stripped naked by the men of the dark ages, has been not only undertaken but actually done. Prince Demidoff, of Russia, says that the Grand Duke Leopold II., of Tuscany, has planted trees, shrubs and plants on his mountains where nearly all had disappeared, except here and there an ancient oak of eight hundred years of age, which, through veneration, had been spared—"woodman, spare that tree"—that he has clothed his old mountains with *fifty millions* of trees, shrubs and plants.

England is indefatigable in this grand line of operation. She has for a long time succeeded in renewing her forests; and indeed you well know that she, to her credit, has for centuries had an entire system of laws to save her forests. She has had the worth of her money out of all this care. Her thousand sea giants, her fleet, have been built and maintained by her forests. Now indeed she has entered upon a new economy on a scale of greatness—I mean her iron marine, which already makes her oaks look shrubby in comparison! There are no oak trees near seven hundred feet long to make keels for her Leviathan. There are no trees too large to build her cutters. Nor does Britain want wood to cook and warm her. Down below, in the cellar of the world, where God put the primitive forests and compressed them into coal, we descend for our fuel. Some say truly, that while England has a goodly quantity in her cellar, that Uncle Sam's coal cellar is considerable larger than all England—her coal cellar included! Our house is large. We want a great cellar. We want good and great relations and friends. We want as many good and great men as can occupy a farm four thousand miles wide by nearly three thousand long, and which must be pieced out by good will and fair purchase too. Let posterity put a finis to this sentence!

Relations sometimes quarrel hard, but those who know no blood in common, fight harder; the fight of the latter, *à l'outrance*—the former often return to friendship. With one tongue, with one view—glory in agriculture and the mechanic arts; with one history, with millions of assimilating points, with the red right hand

of lightning shaking each other at all hours of the day, England and America cannot choose but be friends!

Ladies, I know that you are for it. Gentlemen, you I know will do as the ladies do. They are the very fountains of civilization, and long may the empire endure of such men and such women as now make up in English speech nearly *sixty millions* of individuals.

We now say God bless you, and leave you to look at the plentiful feast of reason outspread before you, in the *Crystal Palace of the city of New-York!*

ANNIVERSARY ADDRESS

BEFORE THE AMERICAN INSTITUTE, AT THE CRYSTAL PALACE, OCTOBER 20, 1857.

By the Hon. N. P. BANKS, *Speaker of the House of Representatives.*

MR. PRESIDENT, LADIES AND GENTLEMEN—The year which is about to close will constitute an epoch in our industrial history. It has alternately elated and depressed men of all pursuits. Its opening promised a season of unparalleled prosperity. The farmer, mechanic, and merchant entered upon its duties with high hopes. They looked for the abundant fruits of the earth, and the full products of the artisan in the present and coming year as a means of breaking the bands of monopoly and reducing prices to the natural level upon which flows uninflated trade, the "calm health of nations." An untoward spring and a chilling summer periled the early-promised harvest; but the autumn opened with unusual splendor. The luxuriant vegetation, robed in its most gorgeous colors, gave us but a part of our autumnal pleasures. It extended the beneficent season of summer, repressed the biting frost, and filled the garners of industry with such products as the Goddess of Plenty showers upon her chosen followers. Then new calamities broke upon us and dispelled the happy visions that hovered about us. Commerce, that rests upon its faith in men, stood without solace or support, and sober industry was paralyzed. The full harvest yet lies in the valley of the West, and the exhausted granaries of the East wait the moment when restored credit and lenient seasons may permit the needed transfer. There are few events in life that more strongly challenge sympathy than such revulsions in the commercial world. It is sad enough to see fortunes dissipated in an hour that have cost the

frugal and self-denying labor of half a century; to witness the sudden check of a trade that spanned both hemispheres, and to find settled ruin in circles where prosperity seemed to have chosen its home. But it is a far more touching sorrow when labor finds the temples of its toil closed, and is compelled to wander away upon unfrequented courses, purposeless, homeless, and breadless—the avenues of destitution and crime only opening their broad ways before it. Such events demand that consolation and courage from secular and sacred ministrations should be breathed upon the overstrained and desolate heart. Such revulsions as that now upon us, cannot occur without breaking up routine courses of life, and driving new agents to novel and unexplored fields of effort. It is in this way that communities and States sometimes discover new sources of wealth, in events which may have crushed individuals and families. They develop unexpected energies, and attain prosperity in novel forms and new quarters of the world. The greatest advances in civilization have often sprung, and will yet again rise, from trains of individual and family misfortune. We cannot measure by standards of human wisdom the ends of a more than human destiny.

It is an idle fear that the paralysis which has fallen upon organized industry will leave the resistless energies of the American people prostrate and powerless. We must look for such developments as energy will suggest to those who suffer from the suddenly-broken purposes of a settled life. In every circle new ideas will mark out new courses of conduct, and necessity compel adherence to newly-formed resolutions. How important is it that the active agents in such great changes should receive counsel and encouragement from those who have faith in men and in the right, rather than that the heart should be chilled by suggestors of despair!

It is in this view of recent events that I venture, upon this interesting anniversary, to present a few considerations bearing upon the choice of individual vocations and the elements of national wealth.

A chief defect in the American system of education is the purposeless character of its discipline. A purposeless man can have no power but such as accident may confer upon some inanimate agent, and an objectless training in the formation of the active agents of society is as inefficient as the want of purpose in men. It is no uncommon thing to see young men run in a few years the gauntlet of every vocation, cheering on others in the same course by an accidental success, or obstructing the natural courses of business by inevitable failure, forgetting, and teaching others to forget that the first element of success is proper discipline and qualification. Vacillating purposes like these naturally lead us to identify that which we call respectability and dignity with those employments in which listless inactivity or the adventitious acquisition of wealth are probable results. There can be nothing further removed from the truth. The dignity of labor is in its results, and not in the form of employment. The peerless statesman of England, who, after prolonged study of diplomatic papers, throws himself upon the hearth-rug to find thirty minutes' sleep before a sea-cole fire, exhibits as little dignity in the form of his employment as the swarthy smith who fashions at the forge the anchor at which commerce rides in safety; and yet the unattractive toil of the statesman may have given liberty to a continent or free bread to suffering people, silencing the cry of hunger, and stifling the rising appetite for crime. The true dignity of labor is in its results, and not in the conventional forms in which it is employed.

The science of statistics is of so recent growth with us, that it is difficult to establish, from the data it furnishes, the exact relation which our national pursuits have borne to each other in past time as to numbers employed, or to their bearing upon the accumulations of national wealth; but we may approximate a tolerably correct conclusion by referring to the same interests in more matured states. In Holland, in 1841, the product of agricultural history was $181,000,000; that of manufacturing industry, $144,000,000; and the estimated product of commerce, $65,000,000: thus, of $390,000,000, commercial industry gave but little more than a sixth part, while manufactures and mechanics afforded 37

per cent. of the entire wealth of the state. In France, in the same year, the product of agriculture was $800,000,000; manufactures, $400,000,000; commerce and navigation, $266,000,000. Of an industrial product of $1,466,000,000, that of commerce is but 18 per cent., while the mechanic arts furnish a third of the whole amount. The industrial product of England in 1840 was $630,000,000, and of all other pursuits, $855,000,000. Allowing to commerce a fifth of the aggregate, as in the case of Holland or France, or even a quarter part, it is still far below that of manufactures and the mechanic arts. Neither in England nor the United States, in the census of 1850, is the product of commercial industry separately stated, as was the case in both countries in 1840; but it is safe to assume the same proportions, and, first, as to the number employed: There were, in 1840, a million persons engaged in the United States in manufacturing and commercial life, of which less than one-third were in commerce. The same proportions are found in New England for the same year. In 1850, there were 2,400,000 employed in agriculture of the white male population over fifteen years of age, and 1,596,000 in commerce, trade, mining, manufactures, and the mechanic arts. Deduct from this million and a half three hundred and thirty-eight thousand persons, free and slave, who were employed in mining, commerce, ocean, sea and river navigation, it leaves one million and a quarter free manufacturers and mechanics—just half the number engaged in agriculture, and three-quarters of all other pursuits. Their industrial product is fabulous. That of agriculture for the present year is not less than two thousand millions; of manufactures, fifteen hundred millions; and in commerce, a thousand million dollars; and this accompanied by an unexampled energy, and a specie basis for its trade in the country, that, at the close of the present decennial period, will amount to nearly three hundred million dollars. Nothing less than panic will persuade the world that such people are poor. From these facts I state the elements of national prosperity to be:

First —Agriculture.

Second.—Manufacturing and mechanical industry.

Third.—Commerce.

It is not my purpose to dwell upon the merits of land culture as the chief element in the happiness of individuals and in the wealth of nations, but to confine my remarks to the pursuits of men in crowded communities and commercial cities. Commerce, by the brilliancy and the grandeur of its enterprises, attracts its full share of consideration. It rarely presents itself to the imagination in its minor features of detail and retail, of barter and exchange, in which the half dimes and threepences are melted into massive bars of bullion. To name commerce is never to suggest its minute accounts, insufficient measures, questionable invoices, custom-house oaths, its shifts, evasions, and bankruptcies. We look rather upon insolvency as part of the machinery of commissioners' courts, and the scales are an emblem of the court-house, and not of the warehouse. Emperors, kings and commons, monarchies and republics, are alike complaisant and subservient in the presence of the merchant princes of the Stock Exchange, and royalty uncovers in the presence of the money king; but we forget the darkened lands and rooms where German and Iberian Jews accumulate the world's wealth in dribblets—in mills, centimes, drachmas, and all the uncouth denominations in which the demon avarice dresses its measures of value and its synonyms of evil. The prosperous city—architectural palaces of beauty, where trade holds morning and evening *levées*, her *matinée* and *soirée*—ships that float from empire to empire, dressed in the colors of the ocean queen, or named for the glancing sunbeam, connecting them by ties of interest and pleasure, and distributing every product of the industrial world—such are the bright visions with which commerce enchants us. Were the records of nations lost, we could read their history in their commercial monuments, their splendid cities, and floating palaces, and discover in their merchant princes every trait of character that elevates or degrades the human family. How London vaunted its Crystal Palace of 1851; and with what spirit Paris retaliated with her Exposition Universelle of 1855, surpassing, if possible, the rivalry and friendship of French Emperor and English King in ancient times upon the field of the cloth of gold. With what interest does the world regard the Empire City of New-York, with its palace of crystal,

that will double its three-quarters of a million of people in twenty years, and draw its quota of increase from the rock-hewn cities of India, and the celestial and flowery kingdom. Boston, like the Saxon and Norman kings looks for the enlargement of her empire. San Francisco every other year springs from its ashes with renewed life and beauty, and St. Petersburg, a year or two since, thought the best remedy she could suggest for the sick man she had in view was to rob him of his chief city, Constantinople, and was no doubt astonished that her patient refused the prescription. Their financial chiefs are not unworthy comparison with warriors, statesmen, and philosophers, the Rothschilds and Barings of the Old World, and Girard, Astor, Peabody, Lawrence, and Cooper, of greater fame in the New, under whose direction industry thrives, colleges, schools of science and art, and public libraries are established. Nevertheless, it is a fair subject of inquiry how far the happiness of a people is to be secured by commerce alone.

The pursuit of wealth does not of itself liberalize men. A negative quality is the surest evidence of a capacity for accumulation. The steady gains that too often depend upon closing the avenues of the heart to the calls of charity, and even of liberty, are the lowest characteristics of trade. A more adventurous spirit strikes out new channels of communication, and binds together states that, separated by friths and seas, were left in enmity or ignorance. Such generous enterprises compensate for the narrower and harder spirit of trade, and by courageous intelligence achieves benefits that never spring from the closely-hoarded accumulation of inconsiderable gains. Chance, however, at the end, is the great arbiter of its destinies. The conflagration sweeps over a city, and its accumulated treasures are destroyed. Extravagance, corruption, crime, sap the integrity of its agents, and defalcations, forgeries, bankruptcies ensue. A causeless panic spreads universal terror, the boldest men are paralyzed with fear, and lose all confidence in each other. Contagions blight its nerveless agents, or the earth puffs with wind, and, like the argosies of the merchant of Venice, their frail ventures are lost:

> "From Tripoli, from Mexico and England,
> From Lisbon, Barbary and India,
> Not one venture 'scapes the dreadful touch
> Of merchant-marring storms and rocks."

It is a manly spirit that rises superior to ills like these; re-creates destroyed fortunes, and reëstablishes the confidence of the world in the integrity of men, by discharging obligations that the law regarded as cancelled by misfortunes. Though its mission is the distribution of the world's wealth, its own prizes do not follow the same liberal law. They bring together too often, in close proximity, the palace and the hovel, and show in the most favored localities,

"How wide the limits stand
Betwixt a splendid and a happy land."

It is not easy to give an exact line of demarcation between the industry of mechanics and manufacturers. Unlike commerce, both change the character of the material passing through the hands of its agents, instead of making an exchange merely, giving them a new form and greatly increased value. The measure of increase is the cost of labor and the profits of capital invested. As a national interest, manufacturing industry must be classed with mechanic arts, as it operates by a combination of material, machinery, labor, capital and skill, to produce national wealth in new and improved forms. The mechanic arts have a broader range and influence than either manufacturing or commercial industry. The term *mechanic* is employed to denote that branch of philosophy which treats of the equilibrium and motion of solid bodies, and its signification is so far extended as to embrace the abstract laws of motion and the equilibrium of all bodies, solid, fluid, or aëriform. From a range of investigation so extended, and a philosophy so abstruse, the great men of antiquity and of modern times have deduced the simple powers which every mechanic comprehends and employs in his least important labors, viz: the lever, pulley, the wheel and axle, the inclined plane, the screw and the wedge. Science, philosophy, arts, statesmanship and war have no prouder names than those connected with the discovery and development of these simple mechanical powers.

The founder of mechanical science is no less a man than Archimedes. He discovered the inclined plane, the pulley, the screw, and the lever, to which the ancient mechanicians reduced all mechanical powers. The labors of Galileo, as a mechanic, are considered to be higher proofs of his transcendent genius than

his discoveries in astronomy. He suggested the pendulum and its application to the measurement of time. The Marquis of Worcester imparted to the world its first knowledge of the power of steam. Sir Christopher Wren was no less distinguished for his mechanical inventions than for St. Paul's Cathedral—the imperishable monument of his genius as an architect. Newton gave an importance to astronomy it had never attained by the application of mechanical laws to the phenomena of the heavenly bodies. Coulomb discovered the nature and law of friction. The clustering stars have no brighter lustre than the undying names of those who have applied the discoveries of these founders of mechanical science to the inventions of modern times, as Watt, Fulton, Whitney, Morse, Hoe, Adams, and many others. It may seem adventurous to connect unlettered mechanics with the fathers of the science, or with the successful inventors of modern times. But they are not separated by ideas or purposes. Their aspirations are in unison. It might have been easier for the philosopher to explain the cause of his success or failure; but the demonstration of the mechanic and the philosopher is the same. Invention is no dainty goddess. She dispenses her bright thoughts wherever she finds the patient observer. She is the same to the alchemist who wastes a life in fruitless endeavors to fuse a new metal, and to the boy who gives new powers to the steam engine by coupling its detached parts with a string, that he may escape for a moment to his play. Mechanical invention is necessarily antecedent to every form of successful industry. It precedes agriculture in its most primitive development, and modern field husbandry is practicable only through the aid of machinery. Seed sown by such help in one or two days, which could not be sown in twenty, and crops harvested in a week by the same aid, that could not be gathered in a month, if at all, by manual labor, make a difference in the products of a farm equivalent to the fruits of a whole season. It must also precede all successful commerce, as it is by machinery alone that a surplus is obtained which affords to commerce opportunity for employment. The influence of mechanical invention upon social life is inappreciably great; and, as an agent of civilization, all other pursuits fade before it. Who can mea-

sure the importance of recent agricultural improvements—of railroads—of the telegraph, the daguerreotype and photograph—of the cotton gin that creates the cotton crop? The sewing machine will work as great a change in the family as railways have in communities and States. We have seen at this exhibition a perfect watch, unsurpassed in beauty of workmanship and for service, that is made by machinery, and under one roof, where the roughly swedged materials are fashioned into the perfect watch in the hours intervening between morning and evening—an achievement never before attempted in any part of the world. And I understand that machinery is in progress of construction that will secure the manufacture of as perfect time-keepers at a cost of three dollars, as are now imported at a cost of three hundred. Time is no inefficient agent in the work of civilization. It was among the last of the public declarations of Sir Robert Peel, that England owed to her mechanic industry the power with which she had passed through the wars of half a century: that furnished her exchequer; that sustained her credit, floated her triumphant navies, and placed for a time in her hands the trident of the seas. The same element of national wealth in France and England enabled them to breast and turn the tide of Russian aggression in the late war. Supreme in everything material, it has also attained the dignity and elevation of the fine arts. The grandest conceptions and creations of genius, in sculpture, painting, poetry, and music, are repeated in perfect and numberless copies, until they are universally known and appreciated. How is it possible to enumerate the multitude of beneficent inventions that impart the elements of science and truth to the young, and make happy the declining moments of honorable age; that spread before us, morning and evening, in the daily newspapers, the transactions of every part of the world; that accompany us through every moment of life, softening its cares, deadening its sorrows, and heightening its joys, from the moment that the infant presses the white breast of its mother, until that other moment when it moves upward on the inclined plane of life, until—a second time a child—it gently falls upon the bosom of God. What higher appeal can be made to healthful ambition—what names upon the

roll of fame are dearer to human hearts than those borne upon thy roster—what nobler pursuit is open to man than that of penetrating the mysteries of earth, air, fire, and water in thy service, sweet goddess of invention! mother of peaceful industry and companion of liberty!

> "While the apple grows on the apple tree,
> And the wild wind blows over the wild wood free,
> And the deep river flows to the deeper sea;
> And they cannot help growing, and blowing, and flowing,
> Turns the heart of the world to thee."

The elements of our national wealth are far from their full development. Greater changes than we have yet experienced will occur, and individual fortunes more gigantic than any yet accumulated will be suddenly rolled up, to be as suddenly dissipated. Nature does not encourage gigantic accretions of power in States or men. Ponderous empires find their solvents, and overgrown individual fortunes their proper distributors. In this country, as in England, mechanical industry, so essential to the development of the vast mineral resources of the continent, and to the consumption of agricultural products, cannot fail to reward its agents with the wealth that follows successful enterprise. But it has a higher claim to our encouragement, in the fact that while it does not shut out the accumulation of such fortunes as will satiate ambition, it affords a more certain guaranty for the equable distribution of its profits among all its disciples. While we cannot but rejoice in the highest prosperity of our country, we ought not to forget that happiness springs rather from general distribution than from great accumulation of wealth in single hands; and that those pursuits which embrace the greatest numbers, and distribute most equally the profits of industry, are the only sources to which we can look for the happiness of the people, for just government, and for a stable national prosperity.

LIST OF PREMIUMS

AWARDED BY THE MANAGERS OF THE TWENTY-NINTH ANNUAL FAIR OF THE AMERICAN INSTITUTE, 1857.

AGRICULTURAL AND HORTICULTURAL DEPARTMENT.

Fat Cattle and Sheep—Grass-fed Cattle.

Judges—Christopher Gwyer, Wm. Lalor, David Allerton.

Chas. G. Teed, Somers, Westchester county, N. Y., for the best pair of Durham steers. Silver plate, $25.

Thos. Wheeler, Dutchess county, N. Y., for the second best pair of steers. Silver cup, $15.

J. Van Alstyne, Ghent, Columbia county, N. Y., for the third best pair of steers. Silver cup, $10.

Harrison Barnes, Newcastle, Westchester county, N. Y., for a pair of fat oxen. Silver cup, $8.

Stall-fed Cattle.

Levi Van Vliet, Clinton, Dutchess county, for the best pair of stall-fed cattle. Silver cup, $15.

Chas. Bathgate, Morrisania, N. Y., for a fat heifer. Silver cup, $10.

Benjamin Whitlock, West Farms, Westchester county, N. Y., for a fat calf. Bronze medal.

Daniel Sands, Washington, Dutchess county, N. Y., for fat ewes. Silver medal.

Thos. Seward, Jefferson Market, N. Y., for fat wethers. Silver medal.

Fat Hogs.

Judges—Stephen H. Cornell, Fred. Rollwaggen, Senr., Joshua M. Varian.

Wm. Love, Sixty-fifth street, for fine Suffolk pigs, and a large hog. Silver medal.

Poultry and Pigeons.

Judges—John A. Bunting, Wm. Ebbitt, John W. Chambers.

M. Howland, 15 Washington Square, for an assortment of fancy pigeons. Diploma.

L. Aspinwall, 54 South street, for three pairs of very choice pigeons. Diploma.

M. R. Beam, 154 Twentieth street, for superior fancy pigeons. Diploma.

E. M. Hammond, 88 Clinton street, for superior fancy pigeons. Diploma.

H. B. Johnson, Paterson, N. J., for superior silver-lace Seabright bantams. Diploma.

Agricultural Productions.

Judges—Wm. J. Young, E. T. Reaney.

Wilson J. Hunt, Newtown, L. I., for the best barrel of spring wheat. Silver cup, $20.

E. Sherman, Searsville, Orange county, N. Y., for the best barrel of rye. Silver cup, $15.

S. D. Crispel, Hurley, Ulster county, N. Y., for the second best barrel of rye. Silver cup, $8.

E. Sherman, Searsville, Orange county, N. Y., for the best barrel of buckwheat. Silver cup, $10.

S. D. Crispel, Hurley, Ulster county, N. Y., for the best barrel of oats. Silver cup, $15.

E. Sherman, Searsville, Orange county, N. Y., for the second best barrel of oats. Silver cup, $8.

Flour, &c.

Judges—Charles A. Hamilton, Edward Cromwell, Stephen Bonnel.

Hecker & Brother, Croton Mills, N. Y., for the best barrel of wheat flour. Silver cup, $10.

Wild Pigeon steam mills, St. Louis, Mo., Nason & Collins, (agents,) 23 Water street, N. Y., for the second best barrel of wheat flour. Silver medal.

Washington Mills, Rahway, N. J., for superior Samp, Hominy, and Wheaten Grits. Diploma.

Products of the Dairy.

Judges—Charles M. Carpenter, W. S. Badeau.

Jacob Kimble, jr., Newton, N. J., for the best butter. Silver cup, $8.

A. Shorter, jr., Newton, N. J., for the second best butter. Diploma.

Fruit—1st Series, September 15 *to* 29.

Judges—Wm. Reid, Lewis Berckman, Richard Mullen, Thomas Hogg, Wm. Chorlton.

Ellwanger & Barry, Rochester, N. Y., for the best collection named fruit. Silver cup, $20.

John W. Bailey, Plattsburgh, N. Y., for the best collection named variety of apples. Silver cup, $15.

John Brill, Newark, N. J., for the best fifty named varieties of pears. Silver cup, $15.

John W. Bailey, Plattsburgh, N. Y., for the best dish of plums. Silver medal.

Mrs. F. B. Durfee, Fall River, Mass., for the best four named varieties of foreign grapes. Silver cup, $10.

Thos. Cavanach, Brooklyn, L. I., for the best basket of miscellaneous fruit. Silver medal.

2nd Series, Sept. 30 *to Oct.* 14.

Judges—Charles Moré, Wm. Cranstoun, J. W. Hayes.

John W. Bailey, Plattsburgh, N. Y., for the best collection named varieties of apples. Silver cup, $15.

Joseph Parker, West Rupert, Vt., for the best six named varieties of apples. Silver medal.

Hovey & Co., Boston, Mass., for the best fifty named varieties of pears. Silver cup, $15.

P. T. Quinn, superintendent for Jas. J. Mapes, Newark, N. J., for the best twelve named varieties of pears. Large silver medal.

John Brill, Newark, N. J., for the second best twelve named varieties of pears. Wheeler's Rural Homes.

Edwin Kervan, Broadway, between Seventy-ninth and Eightieth streets, for the best twelve table pears. Barry's Fruit Garden.

John W. Bailey, Plattsburgh, N. Y., for the best dish of plums. Silver medal.

Wm. B. Smith, Brooklyn, L. I., for the best twelve quinces. Downing's Book of Fruit.

William Huggins, gardener to C. Stanton, Brooklyn, L. I., for the second best twelve quinces. Cole's Fruit Book.

Isaac Merritt, Hart's Village, Dutchess county, N. Y., for the best 12 bunches Isabella grapes. Silver medal.

D. Murphy, gardener to J. S. T. Stranahan, Brooklyn, L. I., for the second best twelve bunches Isabella grapes. Diploma.

Mrs. F. B. Durfee, Fall River, Mass., for the best four named varieties foreign grapes. Silver cup, $10.

Richard Lewis, Brooklyn, L. I., for the best two bunches black Hamburgh grapes. Silver medal.

Thos. Cavanach, Brooklyn, L. I., for the best basket of miscellaneous fruit. Silver medal.

D. Murphy, gardener to J. S. T. Stranahan, Brooklyn, L. I., for the best six bunches Isabella grapes. Silver medal.

Jabez W. Hayes, Newark, N. J., for table pears. Trans. Am. Institute.

Third series, October 14 *to* 29.

Judges—Wm. S. Carpenter, Gabriel Marc, John S. Burgess.

John W. Bailey, Plattsburgh, N. Y., for the best collection of named varieties of apples. Silver cup, $15.

A. Saul & Co., Newburgh, N. Y., for the best fifty named varieties of pears. Silver cup, $15.

P. T. Quinn, superintendent for James J. Mapes, Newark, N. J., for the best twelve named varieties of pears. Large silver medal.

Haynes Lord, Staten Island, N. Y., for the best twelve quinces. Downing's Fruit Book.

L. K. Osborn, Tremont, N. Y., for the second best twelve quinces. Cole's Fruit Book.

E. Bagley, Usquebaugh, R. I., for the best peck of cultivated cranberries. Silver medal.

R. T. Underhill, Croton Point, N. Y., for the best four named varieties of native grapes. Silver medal.

Wm. A. Underhill, Croton Point, N. Y., for the best twelve bunches Isabella grapes. Silver medal.

D. Murphy, gardener to J. S. T. Stranahan, Brooklyn, N. Y., for the second best twelve bunches Isabella grapes. Diploma.

W. A. Underhill, Croton Point, N. Y., for the best twelve bunches of Catawba grapes. Silver medal.

E. M. Peake, Hudson, N. Y., for the best new seedling Rebecca grapes. Silver medal.

John Couzens, Dobbs' Ferry, N. Y., for the best two bunches foreign grapes. Silver medal.

Thos. Cavanach, Brooklyn, L. I., for the best basket of miscellaneous fruit. Silver medal.

D. Murphy, gardener to J. S. T. Stranahan, Brooklyn, L. I., for the best five varieties of pears. Silver medal.

D. Murphy, gardener to J. S. T. Stranahan, Brooklyn, L. I., for the best six bunches Isabella grapes. Silver medal.

Francis Brill, Newark, N. J., for the second best six bunches Isabella grapes. Diploma.

Francis Brill, Newark, N. J., for the best six bunches Catawba grapes. Silver medal.

Wm. Huggins, gardener to C. Stanton, Brooklyn, L. I., for freestone peaches. Trans. Am. Institute.

Flowers.—First series, from Sept. 16 *to* 29.

Judges—James Bisset, Wm. J. Davidson.

Charles S. Pell, N. Y. Orphan Asylum, Broadway and Seventy-fourth street, for the best collection of cut flowers. Silver cup, $10.

Thomas Cavanach, Brooklyn, L. I., for the second best collection cut flowers. Silver medal.

J. S. Burgess & Son, East New-York, for the best one hundred blooms of dahlias. Silver cup, $10.

Mateo Donadi, Astoria, N. Y., for the second best one hundred blooms of dahlias. Silver medal.

Andrew Richardson, Fordham, N. Y., for the best twenty-four blooms of dahlias. Large silver medal.

Mateo Donadi, Astoria, N. Y., for the second best twenty-four blooms of dahlias. Parsons' Rose Manual.

Charles Moré, Third avenue and Ninety-eighth street, for the best display of roses. Silver cup, $8.

Mateo Donadi, Astoria, N. Y., for the second best display of roses. Silver medal.

Charles Moré, Third avenue and Ninety-eighth street, for the best twelve named roses. Gray's Text Book of Botany.

Mateo Donadi, Astoria, N. Y., for the second best twelve named roses. Breck's Book of Flowers.

Mateo Donadi, Astoria, N. Y., for the best display of carnations. Silver medal.

Mateo Donadi, Astoria, N. Y., for fine seedling carnations and dahlias. Diploma.

William Fitzpatrick, Broadway, corner Twenty-ninth street, for the best floral basket. Silver medal.

William Fitzpatrick, Broadway, corner Twenty-ninth street, for the best floral design. Silver cup, $15.

Charles S. Pell, N. Y. Orphan Asylum, Broadway and Seventy-fourth street, for the best twelve blooms of named dahlias. Silver medal.

Second series, Sept. 30 *to Oct.* 13.

Judges—James Knight, John Mackay, F. Smith.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, for the best collection of cut flowers Silver cup, $10.

J. S. Burgess & Son, East New-York, for the best one hundred blooms dahlias. Silver cup, $10.

Mateo Donadi, Astoria, N. Y., for the second best one hundred blooms of dahlias. Silver medal.

Andrew Richardson, Fordham, N. Y., for the best twenty-four blooms. Large silver medal.

Thomas Wilder, gardener to G. H. Stryker, Fifty-second street, between Eleventh and Twelfth avenues, for the second best twenty-four blooms of dahlias. Parsons' Rose Manual.

Mateo Donadi, Astoria, N. Y., for the best display of roses. Silver cup, $8.

Charles Moré, Third avenue and Ninety-eighth street, New-York, for the second best display of roses. Silver medal.

Mateo Donadi, Astoria, N. Y., for the best display of carnations. Silver medal.

Thomas Cavanach, Brooklyn, L. I., for the best parlor bouquet. Silver medal.

Thomas Cavanach, Brooklyn, L. I., for the best floral basket. Silver medal.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, for the best twenty blooms named dahlias. Downing's Cottage Residences.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, for the best twelve blooms of dahlias. Silver medal.

Andrew Bridgeman, No. 878 Broadway, New-York, for a display of cut flowers. Trans. Am. Institute.

Third series, October 14 *to* 29.

Judges—John Eltringham, Francis Brill.

Thomas Templeton, gardener to Alfred Large, Brooklyn, L. I., for the best collection of cut flowers. Silver cup, $10.

Mateo Donadi, Astoria, N. Y., for the best one hundred blooms of dahlias. Silver cup, $10.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, New-York, for the best twenty-four blooms of dahlias. Silver medal.

J. S. Burgess & Son, East New-York, for the second best twenty-four blooms of dahlias. Parsons' Rose Manual.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, New-York, for the second best collection cut flowers. Silver medal.

J. S. Burgess & Son, East New-York, for the second best one hundred blooms of dahlias. Silver medal.

Charles Moré, Third avenue and Ninety-eighth street, New-York, for the best display of roses. Silver cup, $10.

Mateo Donadi, Astoria, N. Y., for the second best display of roses. Silver medal.

Mateo Donadi, Astoria, L. I., N. Y., for the best collection of carnations. Silver medal.

Wm. Fitzpatrick, Broadway, corner Twenty-ninth street, New-York, for the best pair of hand bouquets. Silver medal.

Thomas Cavanach, Brooklyn, L. I., for the second best pair of hand bouquets. Diploma.

Thomas Cavanach, Brooklyn, L. I., for the best parlor bouquets. Silver medal.

Wm. Fitzpatrick, Broadway and Twenty-ninth street, New-York, for the best floral basket. Silver medal.

Gunarius Gabrielson, superintendent for Andrew Bridgeman, 878 Broadway, New-York, for the second best floral basket. Dip.

William Fitzpatrick, Broadway and Twenty-ninth street, New-York, for the best floral design. Silver cup, $15.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, New-York, for the best collection of plants in pots. Silver medal.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, for the best collection of chrysanthemums. Silver medal.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, for a display of dahlias. Silver medal.

Mateo Donadi, Astoria, N. Y., for a display of dahlias, fine seedling dahlias and carnations. Silver medal.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, for an exhibition of cut flowers. Silver cup, $6.

Amateurs' List.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-Fourth street, for the best twenty blooms of named dahlias. Downing's Cottage Residences.

G. H. Stryker, Fifty-second street and Eleventh avenue, New-York, for the second best twenty blooms named dahlias. Buist's Flower Garden Directory.

G. H. Stryker, Fifty-second street and Eleventh avenue, New-York, for the best twelve blooms named dahlias. Silver medal.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, New-York, for the second best twelve blooms named dahlias. Diploma.

Henry Hudson, gardener to Frederick Griffen, Brooklyn, L. I., for the best pair of hand bouquets. Silver medal.

Henry Hudson, gardener to Frederick Griffen, Brooklyn, L. I., for the best parlor bouquet Silver medal.

Vegetables.—First Series, September 16 *to* 29.

Judges—Francis Briell, Wm. Chorlton, Richard Mullen.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best assortment culinary vegetables. Silver cup, $10.

James Amm, Elizabeth, N. J., for the second best assortment culinary vegetables. Silver medal.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best collection of roots for cattle. Silver medal.

James Amm, Elizabeth, N. J., for the second best collection of roots for cattle. Diploma.

James Amm, Elizabeth, N. J., for the best twelve long blood beets. 1 vol. Horticulturist.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, for the second best twelve long blood beets. Munn's Land Drainer.

Charles S. Pell, New-York Orphan Asylum, Broadway and Seventy-fourth street, for the best twelve turnip rooted blood beets. 1 vol. Saxton's Rural Hand Book.

James Amm, Elizabeth, N. J., for the best Drumhead cabbage. Bridgeman's Gardener's Assistant.

James Amm, Elizabeth, N. J., for the best four heads of Savoy cabbage. 1 vol. American Agriculturist.

S. L. Danfield, No. 249 West Forty-ninth street, for the best three table squashes. 1 vol. Working Farmer.

Wm. Simpson, Jun., West Farms, N. Y., for the best and largest squash. 1 vol. Saxton's Rural Hand Book.

Wm. Simpson, Jun., West Farms, N. Y., for the best and largest pumpkin. Buist's Vegetable Garden.

L. K. Osborn, Tremont, N. Y., for the best twenty ears sugar corn. Silver medal.

John Brill, Newark, N. J., for improved long green cucumbers. Trans. American Institute.

Second Series, September 30*th to October* 13*th.*

Judges—Benjamin Mills, William Cranstoun, William Grant, John S. Burgess.

S. Ruth, gardener to J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best assortment of culinary vegetables. Silver cup, $10.

James Amm, Elizabeth, N. J., for the second best assortment culinary vegetables. Silver medal.

S. Ruth, gardener to J. Fitch, Penitentiary, New-York, for the best collection of roots for cattle. Silver medal.

Anthony Brill, Newark, N. J., for the best twelve long blood beets. 1 vol. Horticulturist.

Samuel Love, Fifty-third street, between Sixth and Seventh avenues, for the second best long blood beets. Munn's Land Drainer.

Anthony Brill, Newark, N. J., for the best twelve turnip rooted blood beets. 1 vol. Saxton's Rural Hand Book.

Samuel Love, Fifty-third street, between Sixth and Seventh avenues, for the second best twelve turnip blood beets. 1 vol. Cultivator.

Samuel Love, Fifty-third street, between Sixth and Seventh avenues, for the best twelve table carrots. 1 vol. Hovey's Magazine.

James Amm, Elizabeth, N. J., for the best twelve roots of salsify. 1 vol. Saxton's Rural Hand Book.

Charles S. Pell, N. Y. Orphan Asylum, Broadway and Seventy-fourth street, for the second best twelve roots of salsify. Bridgeman's Kitchen Gardener.

Anthony Brill, Newark, N. J., for the best twelve table parsnips. 1 vol. Agriculturist.

James Amm, Elizabeth, N. J., for the second best twelve table parsnips. Munn's Land Drainer.

James Amm, Elizabeth, N. J., for the best four heads of cauliflower. Silver medal.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best four heads of Drumhead cabbage. Bridgeman's Gardener's Assistant.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best four heads of Savoy cabbage. 1 vol. American Agriculturist.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best four heads of red Dutch cabbage. Dana's Muck Manual.

John Brill, Newark, N. J., for the best three purple egg plants. 1 vol. Rural New-Yorker.

Anthony Brill, Newark, N. J., for the best twelve roots of solid celery. Silver Medal.

Samuel Love, Fifty-third street, between sixth and seventh avenues, for the best twelve roots of celery. Diploma.

D. W. C. Morris, Bergen Point, N. J., for the best peck of tomatoes. Neill's Gardener's Companion.

J. Pitch, Penitentiary, Blackwell's Island, N. Y., for second best peck of tomatoes. 1 vol. Cultivator.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best three Boston marrow squashes. Neill's Gardener's Companion.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best three yellow crookneck squashes. Dana's Muck Manual.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best three green crookneck squashes. 1 vol. Agriculturist.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best three custard squashes. 1 vol. Working Farmer.

Dyer Williams, Bergen Point, N. J., for the best and largest squash. 1 vol. Saxton's Rural Hand Book.

James P. Kenyon, Little Neck, Flushing, L. I., for the best and largest pumpkin. Buist's Vegetable Garden.

Third series, October 14 *to* 28.

Judges—Francis Briell, Alfred Bridgeman, Thos. Templeton.

John Brill, Newark, N. J., for the best assortment of culinary vegetables. Silver cup, $8.

S. Ruth, gardener to J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the second best assortment culinary vegetables. Silver medal.

S. Ruth, gardener to J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best collection of roots for cattle. Silver medal.

P. T. Quinn, sup't for James J. Mapes, Newark, N. J., for the best twelve long blood beets. 1 vol. Horticulturist.

J. Van Wickel, Newtown, L. I., for the second best twelve long blood beets. Munn's Land-Drainer.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best twelve turnip rooted blood beets. 1 vol. Saxton's Rural Hand-Book.

Henry Smith, Astoria, N. Y., for the second best twelve turnip blood beets. 1 vol. Cultivator.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best twelve table carrots. 1 vol. Hovey's Magazine.

Henry Smith, Astoria, N. Y., for the second best twelve table carrots. Munn's Land-Drainer.

P. T. Quinn, sup't for James J. Mapes, Newark, N. J., for fine carrots and parsnips. Trans. Am. Institute.

Henry Smith, Astoria, N. Y., for a peck of Lima beans. Trans. Am. Institute.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best twelve table parsnips. 1 vol. Am. Agriculturist.

S. Ruth, gardener to J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best four heads of cape brocoli. Silver medal.

Henry Smith, Astoria, N. Y., for the second best four heads of cape brocoli. Diploma.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best drumhead cabbage. Bridgeman's Gardener's Assistant.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best four heads of Savoy cabbage. Dana's Muck Manual.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best four heads of red Dutch cabbage. 1 vol. Am. Horticulturist.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best three purple egg plants. 1 vol. Rural New-Yorker.

Anthony Brill, Newark, N. J., for the best twelve roots of solid celery. Silver medal.

Samuel Love, Fifty-third street, between sixth and seventh avenues, for the second best twelve roots of celery. Diploma.

P. T. Quinn, superintendent for Jas. J. Mapes, Newark, N. J., for the best peck of white onions. 1 vol. Hovey's Magazine.

J. Van Wickel, Newtown, L. I., for the best half bushel of white turnips for table. Allen's Farm Book.

J. Van Wickel, Newtown, L. I., for the best half bushel of yellow turnips for table. 1 vol. Am. Horticulturist.

J. Van Wickel, Newtown, L. I., for the best three yellow crookneck squashes. Neill's Gardener's Companion.

J. Fitch, Penitentiary, Blackwell's Island, N. Y., for the best three green crookneck squashes. 1 vol. Am. Agriculturist.

L. K. Osborn, Tremont, N. Y., for the best three acorn quashes. 1 vol. Working Farmer.

Chas. S. Pell, N. Y. Orphan Asylum, Broadway and Seventy-fourth street, for the best three table pumpkins. Bridgeman's Gardener's Assistant.

J. Van Wickel, Newtown, L. I., for the best and largest pumpkin. Buist's Vegetable Garden.

John Brill, Newark, N. J., for the best twenty ears sweet or sugar corn. Silver medal.

Alexander McCullum, gardener to Mr. James Hooker, Poughkeepsie, for a new variety of turnip. Diploma.

Milk, Coffee, Eggs, &c.

S. D. Bingham, Fifty-second street, between Second and Third avenues, New-York, for the best Orange county milk. Diploma.

Gail Borden, jr., 173 Canal street, New-York, for superior condensed milk. Silver medal.

Alden & Co., 137 Elm street, New-York, for preserved milk. Bronze medal.

R. C. Hepburn, Dutchess county, N. Y., R. Allstrum & Co., agents, 23 South street, for solidified milk. Bronze medal.

Alden & Co., 137 Elm street, New-York, for preserved eggs. Diploma.

Pickles, Preserves, &c.

Judges—Mrs. Martha M. Bridgeman, Mrs. Sarah Chambers, Mrs. Mary E. Hinton.

J. McCollick & Co., 229 Washington street, New-York, for the best assortment of preserves. Silver medal.

Wardell & Warden, 175 South street, New-York, for the second best assortment of preserves. Diploma.

Wardell & Warden, 175 South street, New-York, for the best assortment of hermetically sealed fruits. Silver medal.

M. B. Espy, Philadelphia, Pa., for an assortment of hermetically sealed fruits. Diploma.

Wardell & Warden, 175 South street, New-York, for the best assortment of pickles. Silver medal.

J. McCollick & Co., 229 Washington street, New-York, for an assortment of pickles. Diploma.

J. B. Morrill, 304 Broadway, New-York, for a new article of quince conserve. Diploma.

M. B. Espy, Philadelphia, Pa., for extra natural preserved peaches. Bronze medal.

Miscellaneous Articles.

John L. Mason, 248 Canal street, New-York, for the best self-sealing jars. Diploma.

J. Brown, 248 Canal street, New-York, for the best self-sealing cans. Diploma.

Quinby & Kellogg, 375 Greenwich street, N. Y., for yeast powder and lemon sugar. Bronze medal.

Schoonmaker and Van Dine, 110 Beeckman street, New-York, for good crackers. Diploma.

Belling & Kirsinger, 111½ Third avenue, New-York, for the best maccaroni. Diploma.

Joseph Lombard, 31 West Fortieth street, New-York, for maccaroni. Diploma.

Robert Burnet, 167 Third avenue, New-York, for wire work for garden purposes. Bronze medal.

Peter Archdeacon, jr., Canal street, corner of Broadway, New-York, for assortment of New England popped corn. Diploma.

Hills & Stringer, 98 Fourth avenue, New-York, for Dandelion coffee, "good article." Bronze medal.

A. M. Edwards, 289 Broadway, for aquarium tanks. Bronze medal.

William R. Prince, Flushing, L. I., for the best Chinese potatoes, "Dioscorea Batatas." Silver medal.

Edwin Henry, Flushing, L. I., for Chinese potatoes, "Dioscorea Batatas." Diploma.

B. P. Cahoons, Kenosha, Wis., for mammoth rhubarb. Dip.

A. Bagley, New Haven, Conn., for superior perpetual raspberries. Diploma.

James C. Provoost, Greenpoint, N. Y., for blackberry brandy and Isabella wine. Diploma.

Mrs. M. A. Grover, New Brunswick, N. J., for good tomato wine and raspberry syrup. Diploma.

Mrs. M. A. Weir, Brooklyn, L. I., for good tomato catsup. Dip.

R. F. Hibbard, 102 Fulton street, for the best wild cherry bitters. Diploma.

MANUFACTURING AND MECHANICAL DEPARTMENT.

Agricultural and Horticultural Implements.

Judges—John Harold, Peter Bergen, Lewis Wilson, Jos. E. Bridges.

Treadwell & Jones, 251 Pearl street, New-York, for the best and greatest variety of farm implements. Large silver medal.

Henry F. Dibblee, 100 Murray street, New-York, for a variety of farm implements. Silver medal.

Emery Brothers, Albany, N. Y., Treadwell & Jones, agents, 251 Pearl street, New-York, for the best single horse-power. Dip.

Emery Brothers, Albany, N. Y., Treadwell & Jones, agents, 251 Pearl street, New-York, for the best threshing machine. Dip.

F. N. Smith, Kinderhook, N. Y., for the best horse-power corn sheller. Bronze medal.

W. K. Marvin, 40 Murray street, New-York, for the best gang plow. Bronze medal.

A. Jenning, 169 Tenth avenue, New-York, for the best horse-power hay and straw cutter. Bronze medal.

Sayre & Remington, Utica, N. Y., for the best cultivators. Bronze medal.

W. A. Wood, Hoosic Falls, N. Y., Jacob Ellison, agent, 298 Pearl street, New-York, for the best combined reaper and mower. Silver medal.

R. L. Allen, 189 Water street, New-York, for the best mower with hoisting gear. Silver medal.

F. Nishwitz, East Brooklyn, L. I., for a newly invented mowing machine and horse power. Silver medal.

Farmers' Manufacturing Company, Greenpoint, L. I., for the best tree felling machine, operated by hand. Diploma.

Miles Chambers, 116 Charlton street, New-York, for the best self-acting cheese press. Diploma.

Isaac K. Bennett, Narrows, Pike county, Pa., M. K. Kellam, agent, 74 Cortlandt street, for the best ox yoke. Silver medal.

Henry Killin, 397 East Tenth street, for the best churn. Dip.

Jeptha A. Wagener, 7 Beekman street, Jackacks & Linsay, agents, 157 West Sixteenth street, for the best clover and timothy seed harvester. Silver medal.

H. Wyant, Vincennes, Ind., for the best corn planter. Silver medal.

F. Nishwitz, East Brooklyn, L. I., for the best horse hoe. Diploma.

Geo. W. Mayher, 197 Water street, New-York, for the best hand straw cutter. Diploma.

E. P. & J. A. Cowles, Schenectady, N. Y., for a superior thermometer churn. Diploma.

Henry F. Dibblee, 160 Murray street, New-York, for a garden roller. Diploma.

Treadwell & Jones, 251 Pearl street, New-York, for a garden engine. Diploma.

Geo. Watts, Passaic Works, Newark, N. J., for Johnson's self-regulating wind will. (A silver medal having been before awarded.) Diploma.

Architectural Drawing.

Judges—John B. Snook, Charles H. Mountain, Martin E. Thompson.

W. H. Hume & W. Richards, 127 Clinton Place, New-York, for the best design and model of a gothic cathedral. Bronze medal.

Charles Duggin, 335 Broadway, New-York, for designs and models of country villas. Diploma.

Charles Duggin, 335 Broadway, New-York, for the best architectural drawings. Diploma.

Bells.

N. Hayman, 173 Canal street, New-York, for superior signal bells. Bronze medal.

T. G. Brisbane, 134 Third street, New-York, for an alarm bell. Diploma.

A. Hoagland & R. Jack, Jersey City, N. J., for an improved alarm bell for locomotives. Diploma.

J. Garvey, 385 Bowery, New-York, for a telegraph bell. Dip.

Boats and Oars.

Judges—Quincy C. De Grove, Edward Dela Montagnie

Matthias Ludlum, Fair Haven, Rutland Co., Vermont, Thomas Carter, agent, 205 Bowery, for the best model of a life boat. Gold medal.

C. L. Ingersoll, 250 South street, New-York, for a surf boat, (a silver medal having been before awarded). Diploma.

C. R. Morris, Astoria, L. I., for the best fishing boat. Bronze medal.

F. H. Chapin, 85 Forty-fourth street, New-York, for the best row boat. Diploma.

C. L. Ingersoll, 250 South street, New-York, for a row boat. Dip.

Ezekiel Page, Erie, Penn., for the best ash working oars (a silver medal having been before awarded). Diploma.

Henry Mitchell, 250 South street, for the best spruce oars. Diploma.

Bookbinding, Blank Books, and Stationery.

Judges—Geo. C. Morgan, John P. Burnton, Geo. C. Mann.

Latimer Brothers & Seymour, 15 Nassau street, New-York, for the best blank books (a gold medal having been before awarded). Diploma.

Francis & Loutrel, 45 Maiden Lane, New-York, for a splendid case of blank books. Silver medal.

Martin & Fulkerson, 107 Beekman street, New-York, for excellent specimens of blank books. Diploma.

James Forster, 142 Fulton street, New-York, for the best specimen of bookbinding. Bronze medal.

Harvey & Kennard, 26 and 28 Frankfort street, New-York, for superior specimens of bookbinding. Diploma.

E. B. Clayton's Sons, 161 Pearl street, New-York, for excellent specimens of diaries. Bronze medal.

York Mills, L. T. Valentine & Co., agents, 82 John street, New-York, for superior finished writing paper. Silver medal.

Berlin & Jones, 130 William street, New-York, for a beautiful and extensive variety of envelopes. Bronze medal.

Henry Whitney, Jr., Wm. A. Wheeler, agent, 13 Platt street, New-York, for superior inkstands. Diploma.

G. D. Wells, 18 Dutch st., for an improved parallel ruler. Dip.

A. & F. Brown, 65 Elizabeth street, New-York, for well-made copying-press stands. Diploma.

Jesse K. Park, Marlboro, N. Y., W. E. & J. Sibell, agents, 20 Wall street, for patent crystalline tracing cloth (a silver medal having been before awarded). Diploma.

Gent's Boots and Shoes.

Judges—Harvey Watson, S. Cahill.

Edwin A. Brooks, 575 Broadway, New-York, for the best pair of gent's riding boots, and best pair gent's calf water-proof boots. Silver medal.

Van Dusen & Jagger, 30 Vesey street, for peg and nailed lace boots and brogans. Diploma.

Ladies' Boots and Shoes.

Judges—John Dunham, Thos. Fenton, Ira Merritt.

Benjamin Shaw, 328 Canal street, New-York, for the best ladies' boots and shoes (a gold medal having been before awarded). Diploma.

J. B. Miller & Co., 387 Canal street, New-York, for the best children's shoes. Bronze medal.

John N. Genin, 513 Broadway, New-York, for the best leggins. Diploma.

Brushes.

Judges—Hamlet M. Fairchild, Jas. H. Noe.

J. N. Parker, 506 Pearl street, for the best jewellers' and silversmiths' brushes (a silver medal having been before awarded). Diploma.

J. N. Parker, 506 Pearl street, New-York, for a cannon sponge brush. Diploma.

L. G. Hansen & Co., Manhattanville, N. Y., office 176 Front street, New-York, for specimens of feather brushes. Bronze medal.

Building Materials.

Judges—Joseph M. Shute, Barnes Salmon, W. Blackstone.

J. & R. Lamb, 121 Greene street, New-York, for the best artificial marble (a silver medal having been before awarded). Diploma.

John Kennedy, 73 and 75 West Thirty-fifth street, New-York, for the best statuary marble mantel-piece (a gold medal having been before awarded). Diploma.

West Castleton R. R. and Slate Co., West Castleton, Vt., U. L Hitchcock, agent, 370 Broadway, New-York, for the best marbleized mantels. Gold medal.

Hydeville Marble Co., Forty-second street, between Fifth and Sixth avenues, New-York, for marbleized mantels and table tops. (A gold medal having been before awarded.) Diploma.

John D. Howe, 182 West Twenty-fifth street, New-York, for the best combined sliding and folding window sash, Ford's patent. (A silver medal having been before awarded.) Diploma.

A. M. Cochrane, 280 West Twenty-fifth street, New-York, for the best fire and burglar-proof window blind. Bronze medal.

Thomas Coles, 77 Orchard street, New-York, for an improved and simplified window blind regulator. Diploma.

D. Kelly, Grand Rapids, Mich., for a weather proof blind. Dip.

George R. Jackson & Co., corner of Centre and Howard streets, New-York, for the best prismatic vault lights. (A silver medal having been before awarded.) Diploma.

J. B. & W. W. Cornell, 135 to 143 Centre street, New-York, for vault lights. Bronze medal.

Washington Smith, 259 to 267 West Eighteenth street, New-York, for the best drain pipe. (A silver medal having been before awarded.) Diploma.

R. L. & C. H. Lundy, 192 West Fortieth street, New-York, for stone draining pipes and chimney tops. Diploma.

Washington Smith, 259 to 267 West Eighteenth street, New-York, for hot air and smoke flues. Silver medal.

J. K. Brick & Co., Brooklyn, L. I., for the best fire brick, tiles, and clay retort. (A silver medal having been before awarded.) Diploma.

B. Kreischer & Nephew, 58 Goerck street, New-York, for specimens of fire brick. Diploma.

Sussex Marble and Lime Co., J. F. Randel, agent 48 Pine street, New-York, for specimens of lime. Diploma.

Frederick Evers, 15 East Twenty-seventh street. New-York, for rosewood doors. Bronze medal.

Groebl & Volkmar, Baltimore, Md., for improved marquetry for ornamental flooring. Bronze medal.

Jacob Michel & Co., 125 and 127 Worth street, New-York, for fancy mouldings. Diploma.

John H. Mead, 250 Canal street, New-York, for a new style of ornaments for summer houses, cupola tops, fence and gate posts. Diploma.

J. B. & W. W. Cornell, 135 to 143 Centre street, New-York, for a piece of continuous partition. Diploma.

A. L. Osborn, 414 Canal street, New-York, for the best cement for roofing. Silver medal.

W. E. Childs & Co., 1126 Broadway, New-York, for cement roofing. Bronze medal.

A. Miller, 150 Canal street, New-York, for cement roofing. Diploma.

Wm. Webster, 124 Broadway, New-York, for an arrangement for attaching cords to sashes. Diploma.

Cabinet Ware.

Judges—James C. Baldwin, E. W. Hutchings.

Charles Bushor, 115 South Eighth street, Philadelphia, Pa., for the best oak side-board, "very fine work." Silver medal.

Ethan Whitney, Boston, Mass., for a bureau bedstead, "excellent design." Bronze medal.

Joseph Hanssler, Schaghticoke, N. Y., P. Butler, agent, 79 West Thirty-fifth street, New-York, for the best inlaid work box. Diploma.

Edward Meek, Fifty-second street, New-York, for a portable writing desk. Diploma.

John H. Belter, 552 Broadway, New-York, for a fancy centre table. Bronze medal.

S. Harrison & Son, 350, 352 and 354 West Twenty-fourth street, New-York, for a hinge chair. Bronze medal.

E. C. Woodbridge, 65 Macdougal street, New-York, for an enameled set of furniture. Bronze medal.

G. Winter, 16 North William street, New-York, for a rosewood silver-plated showcase. Bronze medal.

David Kohnweiler, Wilmington, N. C., for a patent magic ventilator, for cooling and perfuming the air. Diploma.

T. C. Houghton, 646 Broadway, New-York, for sofa and chairs. Bronze medal.

Carpeting, &c.

Judge—W. Rowe, Jr.

Hiram Anderson, 99 Bowery, N. Y., for specimens of tapestry ingrain carpeting. Diploma.

Wm. S. Pratt, Williamsburgh, L. I., for anti-moth dust-extracting paper, for underlaying carpets. Diploma.

Carriages, Sleighs, &c.

Judges—Jas. H. Green, Wm. Wright, Thos. Sparling.

John Stevenson, Twenty-seventh street, N. Y., for a railroad car. Silver medal.

G. and D. Cook & Co., New Haven, Conn., for an exhibition of buggies, wagons, &c. Large silver medal.

Wood Brothers, 410 Broadway, N. Y., for an exhibition of carriages. Large silver medal.

T. W. & I. H. Mulford, Orange, N. J., for the best express wagon. Bronze medal.

Fielding Brothers, Forty-first street, near Third avenue, N. Y., for an express wagon. Diploma.

James Gould & Co., Albany; Wood Brothers, agents, 410 Broadway, N. Y., for the best single sleigh. Diploma.

James G. Ostrom, Rhinebeck, N. Y.; Wood Brothers, agents, 410 Broadway, N. Y., for a single sleigh. Diploma.

Stivers & Smith, 89 Eldridge street, N. Y., for a pony sleigh with pole. Diploma.

D. Demarest & Son, Newark, N. J., for the best saddle trees and stirrups. Diploma.

Clocks and Watches.

Judges—Felix A. Finn, Henry Glover, John Cottier.

Reeve & Co., corner of Centre and Canal streets, N. Y., for the best church clock, a very important improvement in raising the hammer (a silver medal having been awarded). Diploma.

John Sherry, Sag Harbor, L. I., for a church clock. Diploma.

Appleton, Tracy & Co., Waltham, Mass., for superior patent American lever watch movements. Gold medal.

Calvin Kline, 92 Wall street, N. Y., for superior marine chronometer (a gold medal having been before awarded). Diploma.

Cyprian Chabot, Philadelphia, Pa., for a superior hunting watch case. Bronze medal.

Clothing.

Judges—Peter C. Barnum, Philo Scofield, Abraham J. Post.

A. Stevens, 201 Fourth street, N. Y., for a life preserving coat, lined with fine water-proof cork, for travelers. Diploma.

Combs, Morocco Goods, &c.

John Fenn, 11 Maiden Lane, N. Y., for superior ivory fine combs and tablets. Bronze medal.

James S. Tilley, 307 Broadway, N. Y., for superior shell combs. Bronze medal.

J. Erbe, 195 Broadway, N. Y., for morocco and velvet cases for jewelry and silver ware. Diploma.

Maenel & Miegel, 65 Nassau street, N. Y., for morocco cases for jewelry. Diploma.

Confectionery.

Judges—Mrs. S. F. Whitney, Mrs. J. E. Lewis, Mrs. A. Taylor, Miss R. Hendricks.

Wm. H. Gibson, 41 Atlantic street, Brooklyn, L. I., for superior confectionery. Dip.

Coopers' Work.

Judges—Wm. P. Bensel, Francis O'Brien.

E. A. Hopkins, 153 Third street, N. Y., for the best workmanship on buckets, butter and water kegs. Diploma.

Bowker & Clark, corner Forty-seventh street and Eighth avenue, N. Y., for specimens of machine made barrels. Diploma.

J. C. Wiley, 149 Hammond street, N. Y., for a decanter made from oak staves, "a very ingenious piece of work." Diploma.

Cotton Goods.

Judges—Haynes Lord, Wm. E. Shepard.

New-York Mills, Utica, Oneida county, N. Y., Charles Carville, agent, 182 Fulton street, N. Y., for the best shirtings (a gold medal having been before awarded). Diploma.

Wamsutta Mills, New Bedford, Mass., Willard, Wood & Co., agents, 57 Broadway, N. Y., for bleached sheetings and shirtings (a gold medal having been before awarded). Diploma.

E. & C. H. Kenyon, Westerly, R. I., Willard, Wood & Co., agents, 57 Broadway, N. Y., for Highland plaid linseys. Silver medal.

Thomas Monroe & Co., 59 and 61 Liberty street, New-York, for the best printed cotton flannels. Diploma.

Wm. Smith & Co., Frankfort, Penn., for superior coating checks. Silver medal.

R. Garsed & Brother, Frankfort, Penn., for heavy blue denims. Silver medal.

Willimantic Linen Co., George S. Moulton, agent, 343 Broadway, New-York, for superior cotton spool thread. Silver medal.

Dunnell Manufacturing Co., Pawtucket, Mass., Hall, Dana & Co., agents, 73 Broadway, New-York, for superior printed lawns, "beautiful designs and well executed." (A gold medal having been before awarded.) Diploma.

Wm. Bates & Co., Batesville, S. C., Wood & Merritt, agents, 24 Vesey street, New-York, for superior cotton yarn. Diploma.

Arkwright Mills, Arkwright, R. I., for bleached and unbleached sheetings. Diploma.

Cutlery, Edge Tools and Hardware.

Judges—George H. Swords, A. W. Spies, Francis Many.

Metropolitan Knife and Plate Works, E. V. Haughwout & Co., 488, 490 and 492 Broadway, New-York, for superior specimens of cutlery, excellent quality and elegant finish, A. Ibbotson, manufacturer. Large gold medal.

A. Ibbotson, Brooklyn, L. I., for an improvement in mounting table knives. Bronze medal.

John Rowe, 269 Pearl street, New-York, for superior tailors' shears and scissors. (A silver medal having been before awarded.) Diploma.

Bartlett & Co., Sterling, Mass., J. W. Bartlett, agent, 66 Nassau street, New-York, for specimens of needles. Silver medal.

Booth & Mills, Philadelphia, Penn., W. M. Seymour & Co., agents, 4 Chatham square, New-York, for superior joiners' tools, braces, screw-drivers, &c. Bronze medal.

E. & J. D. Kingsland & Co., Keeseville, N. Y., for superior tools. Bronze medal.

J. Davenport & Co., 10 Platt street, New-York, for superior augers and bits. Bronze medal.

Milton Aldrich, Lowell, Mass., James Kennard, agent, 151 Centre street, New-York, for hand screws. Diploma.

Southgate & Fiske, Worcester, Mass., Samuel L. Fiske, agent, 202 Broadway, New-York, for the best wrenches. Bronze medal.

S. E. Fitch, Albany, N. Y., for a patent pincher wrench. Bronze medal.

Mellville Bryant, Brooklyn, L. I., for a carpenter's gauge, (very ingenious.) Diploma.

J. S. Halstead and J. J. Sigler, Paterson, N. J., for try squares, miter and bevel. Diploma.

Henry Nelson, 103 East Thirty-second street, New-York, for elegantly finished contractors', blacksmiths' and nailers' tools. Diploma.

Jacob Brombacher, 1 Hague street, New-York, for produce samplers. Diploma.

Pascal Terriault, 247 Canal street, New-York, for trammels and T squares. Diploma.

N. B. Chaffee, corner Twenty-ninth street and Eleventh avenue, New-York, for the best parallel vise. Diploma.

Henry A. Frost, Port Richmond, S. I., for ship and floor clamps. Diploma.

J. H. Shirt & Co., Stamford, Conn., J. Davenport & Co., agents, 10 Platt street, New-York, for excellent specimens of files. Dip.

John Wasserscheid, Fifty-third street, near Fifth avenue, New-York, for well made files. Diploma.

Henry Waterman, Williamsburgh, L. I., for circular saws. Bronze medal.

John Sherry, Sag Harbor, L. I., for improved brass casters Diploma.

Plymouth Mills, Plymouth, Mass., Hathaway & Carmer, agents, 261 Pearl street, New-York, for rivets. Diploma.

New England Screw Co., Providence, R. I., for superior wood and machine screws. (A gold medal having been before awarded.) Diploma.

Samuel Hall, No. 129 West Tenth street, New-York, for the best bolts and nuts, buckles, washers, &c. Bronze medal.

Union Butt Co., Providence, R. I., for butts. Diploma.

Atterbury & Co., Trenton, N. J., C. Hammill, agent, 30 Platt street, New-York, for superior American star anvils. Bronze medal.

P. F. Dodge, 10 Beach street, Boston, Mass., for a good display of piano forte hardware. Diploma.

Waterbury Brass Agency, Waterbury, Conn., S. Anderson, agent, 32 Beekman street, New-York, for brass kettles, roll brass and brass wire. (A gold medal having been before awarded.) Diploma.

American Ring Co., Waterbury, Conn., E. Turner, agent, 52 Beekman street, New-York, for brass and plated rings. Bronze medal.

Chamberlain & Co., Paterson, N. J., for cast steel wire. Dip.

D. B. & G. H. Bruen, Newark, N. J., for specimens of malleable cast iron. (A silver medal having been before awarded.) Dip.

C. C. Schaffer, 43 Eldridge street, New-York, for galvanized iron ware and nails. Diploma.

E. B. Clark, Chester, Conn., William J. Buck, agent, 11 Platt street, N. Y., for convex twist cork screws. Diploma.

Edward K. Godfrey, No. 181 William street, New-York, for convex razor strops. Diploma.

William Ashwell, 16 West Fortieth street, New-York, for a meat chopping machine. Diploma.

Lewis N. Dentz, 263 Twenty-eighth street, New-York, for a meat cutter. Diploma.

A. W. Streeter, Shelburne Falls, Mass., for superior braces. Bronze medal.

Thomas Bell, corner One Hundred and Thirty-first street and Fourth avenue, New-York, for Dutton's patent spring brace. Dip.

Bruff, Brother and Seaver, 44 William street, New-York, for hoes and edge tools. Diploma.

A. Simonds & Son, West Fitchburgh, Mass., for superior scythes. Diploma.

Daguerreotypes, Photographs, Hallotypes, &c.

John Johnson, R. B. Brown, John G. Wellstood.

M. B. Brady, 359 Broadway, New-York, for the best plain and retouched photographs. Gold medal.

J. Gurney, 349 Broadway, N. Y., for plain and retouched photographs. (A gold medal having been before awarded.) Diploma.

M. M. Lawrence, 381 Broadway, N. Y., for the best daguerreotypes and miniatures in oil. Large silver medal.

Meade Brothers, 233 Broadway, N. Y., for instantaneous daguerreotypes. Bronze medal.

J. Gurney, 349 Broadway, N. Y., for the best life-size photographs in oil. (A gold medal having been before awarded.) Diploma.

C. D. Fredricks, 585 and 587 Broadway, N. Y., for life-size photographs in oil. (A gold medal having been before awarded.) Diploma.

C. D. Fredricks, 585 and 587 Broadway, N. Y., for the best crayon photographs and hallotypes. Large silver medal.

J. Gurney, 349 Broadway, N. Y., for crayon photographs and hallotypes. Bronze medal.

J. Gurney, 349 Broadway, N. Y., for the best photographs in aquareil. Silver medal.

C. D. Fredricks, 585 and 587 Broadway, N. Y., for photographs in aquareil. Bronze medal.

S. A. Holmes, 289 Broadway, N. Y., for the best photographic views. Silver medal.

B. Hufnagel, 413 Broadway, N. Y., for photographic views and copies of prints. Bronze medal.

D. A. Woodward, Baltimore, Md., E. Anthony, agent, 308 Broadway, for photographs by the solar camera. Diploma.

G. N. Bernard, Syracuse, N. Y., for photographs on wood. Bronze medal.

C. C. Harrison, Fifty-third street, near East river, New-York, for photographic cameras. (A silver medal having been before awarded.) Diploma.

Robert A. Werner, 25 East Broadway, N. Y., for an ingeniously planned diaphragm. Diploma.

A. Beckers, 411 Broadway, N. Y., for a stereoscopic panorama. Diploma.

R. Newell & Co., Philadelphia, Pa., for three delicately tinted portraits. Diploma.

J. Gurney, 349 Broadway, N. Y., for the best photographs in pastel. Bronze medal.

C. D. Fredricks, 585 and 587 Broadway, N. Y., for photographs in pastel. Diploma.

Dentistry and Dental Instruments.

Judges—A. W. Brown, Jas. Alcock, Geo. E. Hawes.

Jones, White & McCurdy, 528 Arch street, Philadelphia, and 335 Broadway, N. Y., for the best single, plain and gum teeth. (A gold medal having been before awarded.) Diploma.

N. W. Kingsley, 28 East Twentieth street, N. Y., for the best block teeth and artificial teeth mounted on gold plate. Large silver medal.

C. D. Allen, 30 Bond street, N. Y., for artificial single teeth mounted on platina, with continuous gums. Silver medal.

Wm. B. Roberts, 55 Bond street, N. Y., for artificial teeth mounted on platina. Silver medal.

A. W. Meader, 52 Bleecker street, N. Y., for block and single teeth mounted on gold. Diploma.

E. A. L. Roberts, 53 Bond street, N. Y., for an important improvement in the manufacture of continuous gum work. Bronze medal.

John D. Chevalier, 360 Broadway, N. Y., for the best dental instrument. (A silver medal having been before awarded.) Diploma.

B. W. Franklin, 57 Bond street, N. Y., for a self-feeding safety lamp. Diploma.

Dies and Chasing.

Judges—F. B. Smith, Robert Lovett, W. H. Bridgens.

William G. Coutts, Astoria, L. I., for the best and greatest variety of electrotype medallions. Large silver medal.

Drugs, Chemicals, &c.

Judges—Geo. D. Coggeshall, Lewis Feuchtwanger, Alex. H. Everett, Eugene Dupuy.

Mrs. Jane E. Barrows, 32 Columbia street, N. Y., for the best paste blacking. Diploma.

T. S. Butler, 39 Vine street, Cincinnati, Ohio, for paste blacking. Diploma.

Charles A. Phillips, 159 Front street, N. Y., for the best white wax. Diploma.

Arthur Nix, McComb's Dam, N. Y., for white wax. Diploma.

E. Gunning, 148 Eighth avenue, N. Y., for the best harness composition. Diploma.

Kerosene Oil Company, Austens, agents, 50 Beaver street, N. Y., for best hydro-carbon preparations. Large silver medal.

Breckenridge Coal Oil Co., depot 98 Greenwich street, N. Y., John Thompson, agent, for hydro-carbon preparations. Silver medal.

H. Parmenter, 138 Pearl street, for lunar oil. Diploma.

Bellevue White Lead Company, 188 avenue C, N. Y., Henry W. Dolson, agent, for the best lead and zinc paints (a silver medal having been before awarded). Diploma.

Alliance White Lead Company, Orange, Essex county, N. J., W. H. Tupper, agent, 53 Thompson street, N. Y., for white lead. Diploma.

Battelle & Renwick, 163 Front street, N. Y., for beautiful specimens of refined saltpetre. Bronze medal.

George R. Hendrickson, 152 West Thirtieth street, N. Y., for beautiful specimens of refined saltpetre. Bronze medal.

John B. Hendrickson, 191 Duane street, N. Y., for nitrate of soda. Diploma.

Enamelled and Iron Furniture.

Judges—Thomas Goadby, John B. Cornell.

P. Tabb, 51 Greene street, N. Y., for a collection of iron railings and furniture. Bronze medal.

Engravings.

Judges—William Barritt, Benson J. Lossing, Charles Toppan.

Elias J. Whitney, 91 Lafayette avenue, Brooklyn, L. I., for the best specimens of wood engraving. Bronze medal.

N. Orr & Co., 52 John street, N. Y., for engraving on wood. Diploma.

Henry Emile Nicoud, Philadelphia, Pa., for a superior specimen of watch case engraving. Bronze medal.

A. W. Overbaugh, 50 Nassau street, N. Y., for specimens of engravings. Diploma.

A. W. Francis, 38 Wooster street, N. Y., for the best specimens of stone seal engraving (a silver medal having been before awarded). Diploma.

William Park, 247 Broadway, N. Y., for stone seal engraving. Diploma.

T. N. Hickcox, 290 Pearl street, N. Y., for stencil marking plates. Diploma.

Minors' Work.

Pupils of Polytechnic Institute, 277 W. Nineteenth street, N. Y., for map drawing. Copy of Webster's Dictionary.

Fine Arts.

Judges—Geo. H. Hite, J. K. Fisher.

Peter Kohlbeck, 229 Bowery, N. Y., for the best portrait in oil. Silver medal.

N. Berger, No. 585 Broadway, N. Y., for the best landscape in oil. Silver medal.

F. Y. Chubb, 477 Ninth avenue, N. Y., for an oil painting. Dip.

Charles Müller, 437 First avenue, for the best marble statuettes. Large silver medal.

Thomas Coffee, 645½ Broadway, N. Y., for the best plaster busts. Bronze medal.

Konrad Huber, 19 Watts street, N. Y., for the best crayon drawing. Bronze medal.

John S. Waterbury, 103 West Thirteenth street, N. Y., for the best mono-chromatic painting. Bronze medal.

A. G. Shaver, 835 Broadway, N. Y., for Italian enamel paintings. Diploma.

Emeline Pettit, 382 Eighth avenue, N. Y., for a pencil drawing. Diploma.

Albert Van Beest & Henry Vanderweile, No. 110 West Twenty-fifth street, N. Y., for water color paintings. Diploma.

John Harding, Clifton, Staten Island, for specimen of scissor type. Diploma.

C. C. Marsh, 129 West Forty-fifth street, N. Y., for Champney's Panorama of the Rhine. Large silver medal

Fire-arms, &c.

Judges—Joseph Hall, Joseph Rose, Thos. F. Peers.

Samuel Colt, Hartford, Conn., for the best rifles and revolvers (a gold medal having been before awarded). Diploma.

Allen & Wheelock, Worcester, Mass., for the best self-cocking and other fire-arms. Silver medal.

New Haven Arms Company, New Haven, Conn., for volcanic repeating fire-arms. Diploma.

J. Johnson, New-York, L. P. Beers, 516 Broadway, N. Y., agent, for the best muzzle-loading apparatus, "very ingenious and useful." Silver medal.

John M. Hathaway, 12 Jones street, N. Y., for the best extension shot charges Diploma.

Ira Buckman, Jr., 95 Bank street, N. Y., for the best cane gun. Bronze medal.

J. Goldmark & Co., 8 Church street, N. Y., for the best sporting percussion caps. Silver medal.

American Flask and Cap Company, Waterbury, Conn., J. D. Frazee, agent, 52 Beekman street, N. Y., for the best military percussion caps. Diploma.

American Flask and Cap Company, Waterbury, Conn., J. D. Frazee, agent, 52 Beekman street, N. Y., for the best powder flasks, shot pouches, &c., "superior workmanship, quality and variety." Bronze medal.

Fishing Tackle.

Judges—John F. Cotte, D. B. Keeler.

J. & J. C. Conroy, 65 Fulton st., N. Y., for the best specimens of fishing tackle, beautiful workmanship and material (a gold medal having been before awarded). Diploma.

Glass, China, and Earthenware.

Judges—Jas. Neeves, Henry W. Haydock, Ebenezer Collamore.

E. V. Haughwout & Co., 488, 490 and 492 Broadway, for the best decorated porcelain and cut glass. Large silver medal.

James Chadderton, 597 Grand street, N. Y., for decorated porcelain. Silver medal.

Union Porcelain Co., Greenpoint, L. I., for superior specimens of porcelain ware, and in mounting of porcelain door-knobs, decorations, &c. Diploma.

Bernard & Co., 213 Greene street, N. Y., for superior specimens of ceramique ware. Silver medal.

Jersey City Pottery, J. O. Rouse, agent, Jersey City, N. J., for specimens of earthenware. Diploma.

Patent Glass Letter Company, 37 and 39 Greene street, N. Y., for a frame of glass letters. Diploma.

Stained Glass.

Judges—Martin E. Thompson, Henry Sharp, Thos. S. Cummings.

Hugh M. Falconer, 95 Fourth avenue, N. Y., for the best stained glass (a silver medal having been before awarded). Diploma.

Alphonse Friedrich, 169 Greene street, N. Y., for a specimen of stained glass. Bronze medal.

Graining.

Judges—H. Mason Dikeman, Peter S. Wilson.

John Payne, 216 West Sixteenth street, N. Y., for the best graining, imitation of wood. Bronze medal.

Stewart S. Bannon, 492 Third avenue, N. Y., for a specimen of graining, imitation of wood. Diploma.

Constant Severin Serville, 598 Houston street, N. Y., for the best graining, imitation of marble. Bronze medal.

John A. Davis, 62 White street, N. Y., for a good specimen of staining. Diploma.

Hats and Caps.

Judges—Edgar T. Ryder, Jos. B. Brewster, Lewis Mealio.

John N. Genin, 214 Broadway, N. Y., for the best silk hats. (A silver medal having been before awarded.) Diploma.

J. W. Kellogg, 381 Canal street, N. Y., for the best ladies' and children's hats. Diploma.

John N. Genin, 214 Broadway, N. Y., for ladies' and children's hats. Diploma.

A. B. Kilburn, Orange, N. J., for the best wool hats. Dip.

J. McCracken & Co., 184, 186, 188, avenue C, for wool hats. Diploma.

J. Smal & Co., 118 and 120 Maiden Lane, for the best men's and boys' caps. (A silver medal having been before awarded.) Diploma.

Straw Hats.

Judges—W. J. Lewis, A. C. Hodges, Luther Chapin.

John Fearn, 135 West Thirty-fifth street, New-York, for superior bleaching of straw hats. Diploma.

Horse Shoes.

Judges—Peter Fullmer, John Rennett, H. McGoldrich.

Salters & Co., 7 Beaver street, New-York, for the best horse shoe iron, a very superior article. Diploma.

Joseph Flynn, corner of Forty-sixth street and Sixth avenue, New-York, for a fine sample of horse-shoes for draft horses. Diploma.

House Furnishing Articles and Utensils.

Judges—John B. Hathaway, Wm. H. Wilcox.

D. Walker & Co., Newark, N. J., for self-rocking cradles. Dip.

Eddy & Hinchman, 45 Gold street, New-York, for superior stair rods. Diploma.

Gottfried Hulemeyer, 170 Varick street, New-York, for good coal scuttles. Diploma.

Samuel Morrill, Andover, N. H., C. A. Durgin, agent, 335 Broadway, New-York, for a clothes-dryer. Diploma.

B. P. Crandall, 47 Courtlandt street, New-York, for the best hobby-horses, children's carriages, &c. Diploma.

Cram and Morris, 105 Maiden Lane, New-York, and 100 Lincoln street, Boston, Mass., for folding tables, stools, clothes-dryers. Diploma.

Lee & Co., 309 Bleecker street, New-York, for gauze wire window screens. (A silver medal having been before awarded.) Diploma.

Charles Zinn & Co., 52 Maiden Lane, New-York, for the best variety and most artistic workmanship of cane and willow ware. Large silver medal.

Stephen W. Smith, 534 Broadway, New-York, for a display of household furnishing articles. Bronze medal.

H. G. Law & Brother, 22 Fulton and 198 Front street, New-York, for the best brooms, wisps, mats, &c. Diploma.

Institution for the blind, James Young, agent, 451 Eighth avenue, New-York, for willow baskets, mats, brooms, &c. Dip.

Samuel Harris, Springfield, Mass., W. J. Buck, agent, 11 Platt street, New-York, for sifting machines. Diploma.

G. C. Wilkinson, 312 Monroe street, New-York, for library and piano bellows. (A silver medal having been before awarded.) Diploma.

E. Y. Robbins & Co., Cincinnati, Ohio, for the best infants' exercising chairs. Bronze medal.

S. A. Bailey, New London, Conn., for a patent cork-fastener. Diploma.

F. C. Treadwell, 5 Canal street, New-York, for Hecker's farina boilers. Diploma.

C. Lockwood, 25 Fulton street, New-York, for fancy goods. Diploma.

E. P. Cooley, J. & C. Berrian, agents, 601 Broadway, New-York, for brooms and wisps. Diploma.

India Rubber and Gutta Percha Goods.

Judges—S. T. Armstrong, Isaiah Deck, A. H. Everett.

S. C. Bishop, 181 Broadway, New-York, for the best pure gutta percha goods and telegraph wire. Gold medal.

Empire Gutta Percha Works, Samuel L. Badgley, agent, 36 Broadway, New-York, for pure gutta percha goods and telegraph wire. Bronze medal.

North American Gutta Percha Company, 102 Broadway, New-York, for vulcanized gutta percha clothing. (A gold medal having been before awarded.) Diploma.

New-York Gutta Percha Comb Company, 16 Beekman street, New-York, for beautiful specimens of hard gutta percha combs. Diploma.

U. S. Vulcanized Gutta Percha Company, Henry Smith & Son, agents, 66 Liberty street, New-York, for the best vulcanized gutta percha machine belting and packing. Large silver medal.

Boston Belting Company, Boston, Mass., Samuel C. Bishop, agent, 161 Broadway, New-York, for the best vulcanized India rubber belting for machinery. Large silver medal.

New-York Belting and Packing Company, 6 Dey street, New-York, for vulcanized India rubber belting for machinery. Silver medal.

Jewelry.

J. & H. P. Jacobs, 407 Broadway, New-York, for jewelry and California diamonds. (A silver medal having been before awarded.) Diploma.

John K. Curtis, 83 Bleecker street, New-York, for a case of jewelry and silverware. Bronze medal.

John Fletcher, 115 Leonard street, New-York, for fancy jewelry, manufactured from the scales of fish. Bronze medal.

Lamps and Chandeliers.

Judges—John Johnson, A. Stratton, Jas. G. Moffat.

Cornelius & Co., Philadelphia, Pa., E. V. Haughwout & Co., agents, 488, 490 and 492 Broadway, New-York, for superior chandeliers and brackets. (A gold medal having been before awarded.) Diploma.

Archer, Warner & Co., 376 Broadway, New-York, for superior bronzes and castings for gas fixtures. Silver medal.

D. D. Miller, 190 Water street, New-York, for the best locomotive lanterns, &c. (A silver medal having been before awarded.) Diploma.

James Radley, 48 and 50 Duane street, New-York, for locomotive lanterns. Diploma.

Solomon Andrews, Perth Amboy, N. J., F. S. Hilton, agent, United States Self-Generating Gaslight Company, 329 Broadway, New-York, for the best fluid gas lamp, for cheapness, simplicity, durability and safety. Silver medal.

Wm. Spooner, 58 Cedar street, New-York, for Knapp's patent lamp for burning rosin oil. Silver medal.

R. C. Overton, 115 East Broadway, New-York, for an ingenious lamp. Diploma.

Isaac Van Benschoten, 275 Bleecker street, New-York, for a lamp for burning lunar oil. Diploma.

Edwin A. Leland, Brooklyn, L. I., Gray Bros., agents, 69 Beekman street, New-York, for a safe camphene or fluid lamp. Diploma.

Carpenter & Campbell, 519 Pearl street, New-York, for a camphene gas lamp. Diploma.

John Newell, 426 Broadway, New-York, for fluid lamps. Dip.

Winslow & Moore, Philadelphia, Pa., J. D. Moore, agent, 15 Bowery, New-York, for fluid lamps. Diploma.

Isaac N. Coffin, corner Sixth avenue and Thirty-second street, New-York, for lard or grease lamps. Diploma.

Hawxhurst & Mott, 69 Fulton street, New-York, for India rubber fluid lamps. Diploma.

Kerosene Oil Company, Austens, agents, 50 Beaver street, New-York, for kerosene oil lamps. Diploma.

Breckenridge Coal Oil Co., John Thompson, agent, 98 Greenwich street, New-York, for Breckenridge oil lamps. Diploma.

Wortendyke Brothers, 29 Beekman street, New-York, for choice specimens of braided and plain lamp wicks, &c. Diploma.

Locks, Safes, Door Springs, &c.

Judges—George D. Lyman, Ira L. Cady.

World's Safe Co., Troy, N. Y., J. C. Morris, agent, 205 Pearl street, New-York, for the best burglar-proof safe. (A gold medal having been before awarded.) Diploma.

Stearns & Marvin, 40 Murray street, New-York, for the best family burglar-proof safe. Silver medal.

Silas C. Herring, 251 Broadway, New-York, for a family and burglar-proof safe. Silver medal.

J. H. Campbell, 539 Hudson street, New-York, for a ladies' jewelry safe. Bronze medal.

John Gunner, 86 Elizabeth street, New-York, for a shutter fastener. Bronze medal.

J. W. Rowe, 421 Ninth avenue, New-York, for a sash fastener. Diploma.

John Stevens, 14 Sixth avenue, New-York, for a blind fastener. Diploma.

Many, Baldwin & Many, 94 John street, New-York, for superior mounting on porcelain door knobs. (A silver medal having been before awarded.) Diploma.

A. F. Chatmans, 120 William street, New-York, for a door and lid spring. Diploma.

Looking-Glasses and Gilt Frames.

Judges—John A. Bunting, John W. Chambers.

Andrew Stevens, 7 Sixth avenue, N. Y., for pier-glasses and base tables. Bronze medal.

Heins & Smith, 538 Pearl street, N. Y., for looking-glass frames. Diploma.

Henry Stidolph, 84 Leonard street, N. Y., for superior frames, imitation of fire gilding (a silver medal having been before awarded). Diploma.

O. L. Gardner, 215 Canal street, N. Y., for photographic and daguerreotype frames. Diploma.

James M. Legeré, Aiken, S. C., for specimens of plastic and ivory frame composition. Silver medal.

Machinery, No. 1.—Railroad Machinery and Fixtures.

Judges—Henry Waterman, Wm. G. Creamer, Philo Hurd.

Fowler M. Ray, 102 Broadway, N. Y., for elliptic and rubber springs. Silver medal.

New-York Metallic Car Spring Co., 316 West Twenty-sixth street, N. Y., for Gardiner's conical volute car spring. Diploma.

Fowler M. Ray, 102 Broadway, N. Y., for re-manufactured rubber springs. Diploma.

Washburn, Hunt & Co., Charles A. Peck, agent, 61 Chambers street, N. Y., for the best car wheel. Bronze medal.

Tyng, Moore & Adams, Jersey City, N. J., for thirty-three inch double plated car wheels. Diploma.

L. B. Tyng, Jersey City, N. J., for a chilled locomotive tire. Silver medal.

Albany Iron Works, Troy, N. Y., for a wrought iron car axle. Diploma.

J. R. Sees, 10 Suffolk street, N. Y., for a locomotive feed water heater (a silver medal having been awarded). Diploma.

J. H. Swan, 322 Fourth avenue, N. Y., Ward & Sinclair, agents, 102 Broadway, New-York, for car seats and reclining chair. Silver medal.

Ward & Sinclair, 102 Broadway, N. Y., for Bailey's car seat. Silver medal.

Albert M. Smith, Rochester, N. Y., Taulman, Low & Cook, agents, 9 South William street, N. Y., for railroad car seat. Diploma.

L. B. Flanders, Cleveland, Ohio, Bridges & Brother, agents, 64 Cortlandt street, N. Y., for a swedge block for repairing T rails. Bronze medal.

Nathaniel Pullman, New Oregon, Iowa, for a switch rail for replacing cars on track. Diploma.

John Trempter, Philadelphia, Pa., for a safety lever attachment to stop engines. Diploma.

A. G. Heckrotte, N. Y., for a coupling and braker for railroad cars. Bronze medal.

Leverett Treadwell, Fifty-second street, between Eleventh and Twelfth avenues, N. Y., for a patent railroad car brake. Diploma.

James Armstrong, Peekskill, N. Y., for railroad signals. Diploma.

S. A. Beers, Bedford avenue, Brooklyn, L. I., for an iron elastic railway. Diploma.

J. R. Hilliard, Paterson, N. J., for an improved lock joint rail. Bronze medal.

Horace Boardman, 181 East Thirteenth street, N. Y., for a coal burning locomotive and locomotive boilers. Silver medal.

New-York Metallic Car Spring Co., West Twenty-sixth street, for a car spring testing machine. Bronze medal.

W. W. Binny, Seneca Falls, N. Y., William Russell, agent, 186 East Twenty-first street, N. Y., for a car journal lubricator. Diploma.

Isaac Van Hagen, Boston, Mass., Taulman, Low & Cook, 9 South William street, N. Y., for a locomotive oil can. Diploma.

Machinery, No. 2.—Lathes, Planers, Boring and Slotting Machines, Bolt Cutters, Dividing and Cutting Engines for Iron, and Models and Drawings of Machines for the same.

Judges—Wm. K. Thomas, Milo Sage, Jas. Stewart.

Leonard & Clark, Moodna, Orange county, N. Y., and 11 Platt street, N. Y., for the best engine lathes (a gold medal having been before awarded). Diploma.

Passaic Works, Newark, N. J., for an engine lathe. Bronze medal.

Hadley Falls Company, Holyoke, Mass., W. J. Buck, agent, 48 Dey street, New-York, for lathes. Diploma.

Chas. A. Bates & S. A. Simonson, 721 Eighth avenue, N. Y. for a model and drawing of an improved method of clinching spikes. Diploma.

Newark Machine Company, Newark, N. J., George H. Renton, agent, for a universal slabbing machine. Large silver medal.

L. B. Flanders, Cleveland, Ohio, for a cylinder boring machine adapted to boring locomotive cylinders. Diploma.

Milo Peck, New-Haven, Conn., for a drop press and atmospheric hammer. Large silver medal.

Snow, Brooks & Co., Meriden, Conn., for fine punch presses. Silver medal.

Roys, Wilcox & Co., East Berlin, Conn., for beautifully constructed tinners' tools. (A silver medal having been before awarded.) Diploma.

Hadley Falls Company, Holyoke, Mass., W. J. Buck, agent, 48 Dey street, New-York, for Dick's anti-friction shears, presses, &c. (A gold medal having been before awarded.) Diploma.

Jacob Brombacher, 1 Hague street, New-York, for a fine set of double lever shears. Bronze medal.

Jas. M. Bottum, 169 Broadway, New-York, for superior watch making lathes. (A gold medal having been before awarded.) Dip.

G. M. Bodine, 22 Maiden Lane, New-York, for an accurate watch maker's lathe. Bronze medal.

Machinery No. 3.—Machines for Working Wood, and Models and Drawings for the same.

Judges—A. S. Bowen, Isaac Stanton, C. L. Goddard, David R. Quick.

McNish & Butler, Lowell, Mass., for the best stave machine. Large silver medal.

Wm. V. Studdiford, 49 Wall street, New-York, for barrel machinery, (Livermore's patent). Silver medal.

H. B. Smith, Lowell, Mass., for the best power mortising machine. Large silver medal.

J. A. Fay & Co., Keene, N. H., for a power mortising machine. (A silver medal having before been awarded.) Diploma.

J. A. Fay & Co., Keene, N. H., for the best tenoning machine. Diploma.

Ball & Ballard, Worcester, Mass., Lysander Wright, agent, Newark, N. J., for a tenoning machine. Diploma.

H. B. Smith, Lowell, Mass., for the best moulding machine. Diploma.

Alfred E. Serrell, 208 West Thirty-seventh street, New-York, for a moulding machine. (A silver medal having been before awarded.) Diploma.

John D. Dale, Philadelphia, Pa., for a model of a moulding machine. Diploma.

Lysander Wright, Newark, N. J., for a scroll saw. Silver medal.

A. D. Waymoth, Fitchburgh, Mass., Lysander Wright, agent, Newark, N. J., for a spool lathe. Large silver medal.

Jas. A. Woodbury, Winchester, Mass., for the best planing machine. Gold medal.

Jones & Crowell, 229 Broadway, New-York, for an excellent wood planer. Large silver medal.

C. H. Dennison, Green River, Vt., Fitchburgh Foundry and Machine company, agents, Fitchburgh, Mass., for a double cylinder rotary bed planer. (A gold medal having been before awarded.) Diploma.

H. B. Smith, Lowell, Mass., for the best small wood planer. Diploma.

Ball & Ballard, Worcester, Mass., L. Wright, agent, Newark, N. J., for a small wood planer. Diploma.

J. A. Fay & Co., Worcester, Mass., agents, for an improved feed gear on a Woodworth planer. Diploma.

J. A. Fay & Co., Keene, N. H., for a blind slat tenoning machine. Large silver medal.

A. Landphere, Erie, Penn., for a cart spoke machine. (A silver medal having been before awarded). Diploma.

J. A. Fay & Co., Keene, N. H., for a foot mortising machine with hub frame attached. Diploma.

N. D. Fisher, 101 Fulton avenue., Brooklyn, L. I., for a model of a hub machine. Bronze medal.

Cassidy & Chism, Albany, N. Y., for a shingle machine. Bronze medal.

Hinckley & Egery, Bangor, Me., for a shingle machine. Dip.

A. Wyckoff, Elmira, N. Y., for a model of a boring machine. Diploma.

Machinery, No. 4.—Steam Pumps, Gauges, Valves, Lubricators, &c.

Judges—John D. Ward, Thomas B. Stillman, John M. Reed, John Breasted.

D. C. Rugg, 17 John street, New-York, for a water gauge. Diploma.

H. R. Worthington, 28 Broadway, New-York, for the best safety steam-pump. (A gold medal having been before awarded.) Diploma.

Ruberts & Crumbie, 72 Water st., Brooklyn, L. I., John Benson, agent, 25 Old Slip, New-York, for a steam pump. Large silver medal.

Guild, Garrison & Co., Williamsburgh, L. I., for a steam pump. Silver medal.

Taylor, Campbell & Co., Brooklyn, L. I., for a safety feed pump. Silver medal.

Blake, Wheelock & Co., 71 Gold street, New-York, for a steam pump. Bronze medal.

John Trempter, Philadelphia, Penn., for a regulating governor for steam engines. Bronze medal.

F. W. Howe, Newark, N. J., for a very elaborate and efficient governor. Bronze medal.

Clarke's Patent Fire Regulator Company, 229 Broadway, New-York, for the best fire damper or regulator. (A gold medal having been before awarded.) Diploma.

John Sutton, 114 Cannon street, New-York, for lubricators. (A silver medal having been before awarded.) Diploma.

John Sutton, 114 Cannon street, New-York, for the best oil cups for journals. Silver medal.

William Gee, 68 Duane street, New-York, for lubricators and oil cups. Bronze medal.

Nason & Dodge, 61 Beekman street, New-York, for the best steam stop-valves. Bronze medal.

Sterry Faucet Company, Norwich, Conn., J. & L. Bissicks, agents, 294 Bowery, New-York, for cocks and valves. Bronze medal.

Forest Agricultural Steam Engine Company, Brooklyn, L. I., for portable steam cross-cut saws and portable farm engine. Gold medal.

P. W. McKenzie, South Second street, Jersey City, N. J., for a revolving blower. Large silver medal.

Discretionary.

Enos G. Allen, Boston, Mass., for the best steam guage. (A silver medal having been before awarded.) Diploma.

Machinery, No. 5.—Hydraulics.

Judges—Thomas Ewbank, George S. Green, Joseph Dixon.

W. & B. Douglas, R. L. Allen, agent, 191 Water street, New-York, for pumps. Diploma.

Silsby, Mynderse & Co., Seneca Falls, N. Y., Cole & Senior agents, 120 William street, New-York, for pumps. Diploma.

A. W. Gay & Co., 118 Maiden Lane, New-York, for Warner's forcing and anti-freezing pump. Bronze medal.

W. H. Harrison, Philadelphia, Pa., for a pump. Bronze medal.

F. Ransom, Brooklyn, L. I., for an anti-choking ship's pump. (A gold medal having been before awarded.) Diploma.

L. P. & W. F. Dodge, Newburgh, N. Y., and Charleston, S. C., for power and hand pumps. (A silver medal having been before awarded.) Diploma.

A. Tower, 124 Broadway, New-York, for power and hand pumps. Large silver medal.

C. & G. M. Woodward, 77 Beekman street, New-York, for a steam pump. Silver medal.

A. W. Cary, Brockport, N. Y., J. C. Cary, agent, 267 Broadway, New-York, for a rotary pump. (A gold medal having been before awarded.) Diploma.

Silsby, Mynderse & Co., Seneca Falls, N. Y., Cole and Senior, agents, 120 William street, N. Y., for rotary hand and power pumps. Diploma.

John Patterson & Co., 61 Fulton street, New-York, for Carpenter's rotary pump. Silver medal.

William D. Andrews, 414 Water street, New-York, for an anti-friction centrifugal pump. Large silver medal.

Samuel Parran, 221 Gold street, Brooklyn, L. I., for a device for discharging water from the holds of ships. Diploma.

Thomas Hanson, 137 Third avenue, New-York, for a pump and pressure machine and hyraulic rams. Silver medal.

Sawyer & Carr, 3 Bedford street, New-York, for an improvement in water-closets. Silver medal.

F. H. Bartholomew, 84 Marion street, New-York, for a self-supply valve cock to water-closet. Bronze medal.

Sawyer & Carr, 3 Bedford street, New-York, for a cut-off for kitchen boilers. Silver medal.

David Seggie, 3 Bedford street, New-York, for a tubular trap for water-closets. Bronze medal.

McNab, Carr & Co., 95 and 133 Mercer street, New-York, for superior valves, couplings, cocks, &c. Silver medal.

S. H. Gibson, 211 Centre street, New-York, for plumber's brass work. Diploma.

Stratton & Hildreth, Worcester, Mass., for Fitt's patent globe valves. Silver medal.

Boston Faucet Company, Boston, Mass., for patent self-closing faucets. Diploma.

Charles J. Bunker, 337 Broadway, New-York, for life preservers. Diploma.

John Titus, (apprentice,) 221 Bleecker street, New-York, for a specimen of workmanship on lead pipe. Diploma.

James H. Wright, 835 Broadway, New-York, for water filters. Silver medals.

William W. Ayres, Worcester, Mass., for a cylindrical filter. Bronze medal.

Boston Faucet Company, Boston, Mass., for a filter. Bronze medal.

Henry Getty, 20 Prospect street, Brooklyn, L. I., for a self-closing faucet. Bronze medal.

F. H. Batholomew, 84 Marion street, New-York, for a swivel lever faucet. Diploma.

Perrini & Boyle, 51 Pitt street, New-York, for a hydrant. Silver medal.

John D. Haines, Yorkville, New-York, for a hydrant. Bronze medal.

Kenyon & Lewis, 145 Grand street, New-York, for a hydrant. Bronze medal.

E. J. Baker & Co., Baltimore, Md., for a hydrant. Diploma.

James Cochrane, 8 Tenth street, New-York, for a non-wasting hydrant. (A silver medal having been before awarded.) Dip.

Corey & Torrey, John street, New-York, for a hydrant. Dip.

John Hyde, 185 Church street, New-York, for syphon waste non-freezing fire hydrant. Diploma.

Samel Pryor, jr., 509 Sixth avenue, New-York, for an improved valve hydrant. Diploma.

W. H. Binney, Seneca Falls, N. Y., for a hydrant. Diploma.

William Fowler, 593 Hudson street, New-York, for a hydrant. Diploma.

Fields & Gerhard, Wilmington, Del., W. Fields, agent, 51 Pine street, New-York, for an anti-freezing hydrant. Diploma.

Thos. Godwin, Yorkville, N. Y., for a combination air-vessel and hose pipe for fire engines. Bronze medal.

Burr & Read, Williamsburgh, L. I., for a diaphragm water meter. Diploma.

James Cochrane, No. 8 Tenth street, New-York, for a water meter. Diploma.

John Johnson, 111 East Eighteenth street, New-York, for a water governor. Silver medal.

A. D. Puffer, Boston, Mass., Hegeman, Clark & Co., agents, No. 165 Broadway, N. Y., for tinned lead pipe. Diploma.

Machinery, No. 6.—Printing Presses and Kindred Machinery.

Judges—Joseph Russell, C. A. Alvord, D. E. Gavit.

Lowe Printing Press Company, Boston, Mass., J. B. Beckwith & Co., agents, 157 Fulton street, New-York, for conical printing presses. Silver medal.

A. & B. Newbury, Windham Centre, N. Y., for a reciprocating cylinder printing press. Silver medal.

Machinery, No. 7.—Grist and Saw Mills.

Judges—F. C. Treadwell, William Ebbitt.

American Rice and Grain Hulling and Flour Manufacturing Company, for a grain and rice hulling machine. Diploma.

George Wheeler & Co., 334 Broadway, N. Y., for a rice hulling machine. Diploma.

Edward Harrison, New Haven, Conn., S. C. Hills, agent, 12 Platt street, New-York, for a grist mill. (A gold medal having been before awarded.) Diploma.

Harris Brothers, Elizabeth, N. Y., A. L. Ackerman, agent, 163 Greenwich street, N. Y., for a smut and scouring machine. (A gold medal having been before awarded.) Diploma.

J. M. Emerson & Co., 371 Broadway, N. Y., for a combination patent portable saw mill. Diploma.

Machinery, No. 8.—Sewing Machines.

Judges—John A. Schenck, James M. Bottum, Joseph Thorne.

Wheeler & Wilson's Manufacturing Company, 343 Broadway, New-York, for the best double thread family sewing machine. (A gold medal having been before awarded.) Diploma.

S. P. Chapin, 408 Broadway, New-York, for hem folders for sewing machines. Diploma.

J. T. Jones, 458 Broadway, New-York, for adjustable binding gauge for sewing machines. Diploma.

William B. Bishop, Brooklyn, L. I., for bosom guide for sewing machines. Diploma.

I. M. Singer & Co., 458 Broadway, N. Y., for a family sewing machine. Bronze medal.

M. Finkles, 421 Broadway, N. Y., for a sewing machine. Dip.

I. M. Singer & Co., 458 Broadway, N. Y., for an embroidery sewing machine. Silver medal.

Watson, Wooster & Co., 449 Broadway, N. Y., for the best single thread family sewing machine, (for cheapness and simplicity). Silver medal.

Machinery, No. 9.—Miscellaneous New Inventions.

Judges—Joseph Dixon, Henry R. Worthington, Thomas D. Stetson.

Seyfert McManus & Co., Reading, Penn., A. B. Wood, agent, 253 Broadway, New-York, for superior steam boiler flues. Gold medal.

Arad Woodworth, 3d, Boston, Mass., for cordage machinery. Gold medal.

Thomas G. Boone, Brooklyn, L. I., for a superior rope machine, embodying a new and superior system of ropemaking. Silver medal.

W. R. Dutcher, Lansingburgh, N. Y., for an improvement in rope and cordage machinery. Silver medal.

John Sherry, Sag Harbor, L. I., for dynamometers (a gold medal having been before awarded). Diploma.

Z. Butt, Lincolnton, N. C., J. M. Lanier, agent, Merchants' Hotel, N. Y., for excavator cart. Silver medal.

Kean & Co., Worcester, Mass., H. Griffin & Son, agents, 114 and 116 Nassau street, N. Y., for bookbinders' shears. Silver medal.

Richard Dudgeon, E. Lyon, agent, 466 Grand street, N. Y., for hydraulic lifting jacks (a silver medal having been before awarded). Diploma.

Eames & Hathaway, Milford, Mass., for a machine for cutting sole leather, and boot-treeing machine. Silver medal.

James W. Martin, Philadelphia, Pa., J. K. Alwine, agent, 377 Water street, New-York, for a self-weighing coal cart. Bronze medal.

H. N. Degraw, Green Island, N. Y., for a bottle washing machine. Diploma.

S. T. McDougall, 335 Broadway, New-York, for a benzole gas machine. Bronze medal.

John Trempter, Philadelphia, Pa., for adjustable guide pulleys. Diploma.

Andrew F. Lapham, L. P. Beers, agent, 516 Broadway, New-York, for a clothes mangle. Diploma.

Josiah Mayes, Cohoes, N. Y., for a washing machine. Dip.

L. W. Boynton, Worcester, Mass., for a hat washing machine. Diploma.

G. C. Wilkinson, 312 Monroe street, New-York, for forge and furnace bellows. Bronze medal.

Miller & Andrews, Providence, R. I., for round leather belting. Diploma.

Byron Boardman, Norwich, Conn., for a blind-wiring machine. Bronze medal.

H. Whipple, Port Richmond, S. I., for a clay pulveriser. Dip.

Edward W. Marsh, 15 William street, New-York, for a journal box. Diploma.

R. Kitson, Lowell, Mass., for a curled hair picker. Diploma.

Samuel Rust, 392 Greenwich street, New-York, for a punch press. (A silver medal having been before awarded.) Diploma.

A. Peavy, Lowell, Mass., for a vessel for melting cast-iron chips. Diploma.

Clarke & Bradley, New Haven, Conn., for a paper box cutting machine. Diploma.

Mechanics' Manufacturing Company, 81 Duane street, New-York, for a portable cotton and hay press. Bronze medal.

E. Fabreguettes, A. Bernard, & Elias Ponvert, 51 Dey street, New-York, for Rolland's patent baker's oven. Large silver medal.

New-York Gutta Percha Co., No. 16 Beekman street, New-York, for a comb-cutting machine. Diploma.

Newark Machine Co., Newark, N. J., for Renton's self-oiling and adjustable hangers for shafting. Diploma.

J. C. Hoadley, Lawrence, Mass., for the honey comb heater, (a superior article). Bronze medal.

Warren Foundry and Machine Co., Phillipsburgh, N. J., for superior water pipes. Bronze medal.

Machinery No. 10.—*Gas, Soda Water Machines, and Electric Machinery.*

Judges—John Johnson, S. H. Maynard, S. K. Zook.

W. G. Sterling, Bridgeport, Conn., for a gas regulator, simple in construction and effectual in action. Bronze medal.

W. J. Demorest, 375 Broadway, New-York, for magic gas cook-stoves. Bronze medal.

L. W. Boynton, Worcester, Mass., for apparatus for heating smoothing irons, and for using alcohol and gas for cooking, &c. Bronze medal.

Charles B. Austin, Williamsburgh, L. I., for gas cooking apparatus. Diploma.

W. W. Batchelder, 34 West Thirty-fourth street, New-York, for an improved argand gas-burner. Silver medal.

S. T. McDougall, 335 Broadway, New-York, for the best power blow-pipe. Diploma.

Samuel Down, 326 West Twenty-second street, New-York, for the best dry gas meter. (A silver medal having been before awarded). Diploma.

Burr & Read, Williamsburgh, L. I., for a gas meter. Diploma.

S. B. Smith, 77 Canal street, New-York, for a hydrogen lamp. Diploma.

N. M. Phillips, 51 Courtland street, New-York, for a useful application of electricity to weighing. Bronze medal.

Horatio D. Sheppard, 9 Spruce street, New-York, for a computer. Diploma.

Saunders Coates, Yonkers, N. Y., for the best portable gas works. (A silver medal having been before awarded). Dip.

C. R. Woodworth & Co., Yonkers, N. Y., and 74 Wall street, New-York, for an excellent portable gas works. Bronze medal.

S. H. Black, 3 Walker street, New-York, for electrotypes models. Diploma.

L. L. Smith, 244 Canal street, New-York, for electrotypes. Diploma.

John Matthews, 437 First avenue, New-York, for the best soda water apparatus. (A silver medal having been before awarded). Diploma.

A. D. Puffer, Boston, Mass., Hegeman, Clark & Co., agents, 155 Broadway, New-York, for a carbonic acid gas generator and refrigerating soda water draft. Bronze medal.

A. J. Morse, Boston, Mass., for a soda water apparatus. Bronze medal.

A. J. Morse, Boston, Mass., for Nichols's patent syrup apparatus. Diploma.

A. C. Brown & Co., Philadelphia, Pa., for Gatchel's improved lightning rods. Diploma.

Machinery No. 11.—*Woolen Machinery.*

Judges—Alex. Knox, John C. Dodge.

Calvin L. Goddard, 3 Bowling-green, New-York, for superior wool burring machinery, feed rolls, &c. (A gold medal having been before awarded). Diploma.

R. Kitson, Lowell, Mass., for an improved wool picker. Large silver medal.

B. T. Nichols, Newark, N. J., for an excellent and ingenious machine for the manufacture of piece hosiery. Large silver medal.

Frederick Schott, Brooklyn, L. I., for power or hand knitting machines. Silver medal.

Samuel Boorn, Lowell, Mass., for composition for the manufacture of shuttle drivers. Diploma.

Machinery No. 12.—Cotton Machinery.

Judges—Alex. Knox, John C. Dodge.

George G. Henry, Mobile, Ala., for his new combination of machinery for the valuable purpose of manufacturing seed cotton into yarns. Large silver medal.

Thomas Standring, Tuckahoe, N. Y., for comb plates and card cleaners. Diploma.

Union Roller Cotton Gin Company, D. L. Wintringham, agent, 6 Liberty street, New-York, for a new and valuable improvement for ginning Sea Island cotton. Gold medal.

Benjamin & Reynolds, Stockport, N. Y., Wm. Benjamin & Co., agents, 30 Broadway, New-York, for a valuable improvement for weaving cotton goods, (Reynolds's patent). Gold medal.

G. Dettwiller & Co., 128 Wooster street, for Weavers' shuttles. Diploma.

Mathematical and Philosophical Instruments.

Judges—Chas. T. Chester, L. L. Smith, Wm. Elliott.

Kline's Patent Compass Manufacturing Co., 92 Wall and 301 Pearl street, New-York, for compasses to overcome local attraction on ship board. Gold medal.

H. W. Hunter, 169 William street, New-York, for the best surveying instruments. Silver medal.

Becker & Sons, Brooklyn, L. I., for beautiful surveying instruments and self-registering thermometer and barometer. Bronze medal.

James H. Brownlow, 184 Cherry street, New-York, for a very simple and ingenious reduction of the celestial globe, with its mechanical appliances to a plane surface. Bronze medal.

John Wyberd, 68 Maiden Lane, and 11 Liberty street, New-York, for night light reflectors, with corrugated surface and air-tight chimney. Bronze medal.

James Adams, 40 Hudson street, New-York, for excellent hydrometers. Diploma.

John Wyberd, 68 Maiden Lane, New-York, for day-light reflectors. (A silver medal having been before awarded). Diploma.

Mechanical Drawings.

Theodore Krausch, Susquehanna Station, Erie railroad; Pa., for a mechanical drawing. Silver medal.

Samuel Stanton, Newburgh, N. Y., for a drawing of a marine engine. Silver medal.

C. W. Knudson, No. 121 West Forty-fifth street, N. Y., for a mechanical drawing. Diploma.

James Gillender, jr., 120 Bank street, for a drawing of the engine of the steamer Metropolis. Diploma.

Melodeons.

Judges—D. H. Wickham, John W. Shackelford, Edward E. Quimby.

W. N. Manning, Rockport, Mass., for a melodeon. Diploma.

Millinery.

Judges—Miss Mary Butler, Miss Mary A. Noble, Miss Lucy A. De Voe.

Mrs. G. Schlegel, 577 Broadway, New-York, for the best millinery. Silver medal.

Mrs. William Simmons, 564 Broadway, New-York, for millinery and head dresses. Bronze medal.

Mrs. P. McMillan, Williamsburgh, L. I., for neatly made bonnets. Diploma.

Minerals.

Judges—Lewis Feuchtwanger, Alexander H. Everett.

Charles W. A. Herrman, 4 Ninth street, New-York, for the best display of mineral specimens, and small cabinets of minerals for schools. Bronze medal.

Berle & Le Gendre, 3 Nassau street, New-York, for a display of native Galena and pig lead. Bronze medal.

Fisher, Bird & Co., 287 Bowery, New-York, for a specimen of California marble. Diploma.

Isaac Parker, 22 Charles street, New-York, for superior specimens of Slate. Diploma.

Musical Instruments.

Judges—Hervey Warren, Warren Hill.

J. F. Browne & Co., 295 Broadway, New-York, for a very superior harp. Large silver medal.

C. M. Zimmerman, Philadelphia, Pa. for drums, violins, and concertina with clarionet attachment. Diploma.

William Ronnberg, 298 Broadway, New-York, for a Bœhm flute. Diploma.

Franz Lauter, 21 Christie street, New-York, for an exhibition of musical instruments. Diploma.

American Steam Music Co., Worcester, Mass., A. S. Denny, agent, for a calliope. Large silver medal.

Naval Architecture.

Judges—W. H. Webb, W. A. Howard, Abraham Turnure.

Nelson Spratt, 4 Manhattan street, New-York, for the best model of the steam frigate "Niagara." Bronze medal.

Robert P. Courtney, 61 Carmine street, New-York, for a model of a yacht. Diploma.

Burr & Co., 114 South street, N. Y., for ship blocks. Dip.

Samuel N. Smith, 182 South street, New-York, for the best double-acting screw wrench. Bronze medal.

Terry & Taylor, 89 Mangin street, New-York, Wm. Skiddy, agent, 101 Wall street, New-York, for Brown's patent anchor gear. Bronze medal.

Samuel N. Smith, 182 South street, New-York, for a steering apparatus. Diploma.

Isaac Boss, 109 South street, New-York, for a mode of reefing, setting and shaking out reefs. Diploma.

Nehemiah Dodge, 24 East Eighteenth street, New-York, for a ship's pump box. Diploma.

Charles Auziere, 299 Pearl street, New-York, for models of glass ships. Diploma.

Needlework, Embroidery, Fancy Articles, &c.

Judges—Mrs. H. E. H. Taylor, Mrs. L. De Voe, Miss E. A. Lewis.

Miss Amelia Needham, 207 Third street, Williamsburgh, L. I., for the best lace work. Diploma.

Mrs. M. L. Adee, 96 Forty-fourth street, New-York, for a specimen of crape embroidery. Diploma.

Madame Shiess, 711 Broadway, New-York, for silk and linen embroidery. Bronze medal.

James Bailey, Brooklyn, L. I., for embroidery and laces. Dip.

Miss Alice V. O'Farrell, 225 West Thirty-fifth street, New-York, for the best worsted embroidery—"Ossian." Silver medal.

Miss Ede, New-York, for a specimen of Embroidery—"Head of Christ." Bronze medal.

Miss Jeannette McPherson, 16 Orchard street, New-York, for a specimen of worsted work. Diploma.

Miss Susan A. Pyron, Franklin, Tenn., for the best piano-cover in raised worsted work. Diploma.

Robert Marshall, jr., Bloomingdale, New-York, for an etagére in leather work. Copy of Webster's Dictionary.

Mrs. Mary Ann Scheiffelé, Sixtieth street, near Ninth avenue, New-York, for the best wax flowers (a silver medal having been before awarded.) Diploma.

Miss Margaret Traphagen, 69 Bedford street, New-York, for a case of wax flowers. Bronze medal.

Mrs. M. Norris, 111 West Twelfth street, New-York, for the best wax fruit. Diploma.

Mrs. L. J. Haslett, 115 Waverly place, New-York, for specimens of wax vegetables. Diploma.

James L. McCurdy, 411 Broadway, New-York, for the best corsets. Diploma.

W. J. Demorest, 375 Broadway, New-York, for the best system of dress cutting (a silver medal having been before awarded.) Diploma.

Mrs. Thomas, 306 Sixth avenue, New-York, for an improved system of dress cutting. Diploma.

C. F. Woodward, 196 Fulton street, New-York, for patent Columbian skirt springs. Diploma.

Forman & Co., 705 Broadway, New-York, for superior skirts. Diploma.

Douglas & Sherwood, 343 Broadway, New-York, for excellent skirts. Diploma.

Ira Perego & Sons, 61 Nassau street, New-York, for the best gentlemen's collars. Diploma.

John Flaherty, 32 and 34 Vesey street, New-York, for an improvement in shirt bands and yokes. Bronze medal.

Lewis & Seacord, 655 Broadway, New-York, for a specimen of shirts. Diploma.

Litchfield & Brady, 97 William street, New-York, for a robe de chambre, smoking jacket and cap, and travelling blanket. Dip.

Troy Hosiery Co., Troy, N. Y., Charles Carville, agent, 182 Fulton street, New-York, for the best white ribbed and plain woolen shirts and drawers. Bronze medal.

Miss Mary S. Smith, Perth Amboy, N. J., for a superior knitted shawl and infant's suit. Diploma.

Miss Anna L. Rapelye, 679 Sixth avenue, New-York, for the best basket of paper flowers. Diploma.

Madame Ideen, 114 Bleecker street, New-York, for fancy hair work. Diploma.

Berford & Shaw, 172 Broadway, New-York, for fancy pearl work on glass signs and flowers. Bronze medal.

Mrs. F. M. Johnson, 245 West Twenty-sixth street, New-York, for the best bed quilt. Diploma.

Mrs. B. W. Franklin, Newark, N. J., for a white quilt. Dip.

Mrs. N. Prentiss, Brooklyn, L. I., for a silk ribbon quilt, made by a lady 85 years of age. Diploma.

Mrs. Dunning, 22 Morton street, New-York, for a quilt. Dip.

Miss Philitia Bailey, Marlborough, N. Y., for the best knitted quilt. Diploma.

Mrs. Finkle, 144 Lawrence street, Brooklyn, L. I., for a knit quilt, by a blind girl 12 years of age. Diploma.

Miss Anna C. Ludlam, 49 Third st., New-York, for a crotchet tidy. Diploma.

Miss Margaret Baird, Vincennes, Ind., for a specimen of knitting, four pair of stockings at once on a pair of needles. Dip.

Miss Searles, 41 East Thirty-eighth street, New-York, for the best potichomanie vases. Diploma.

Mrs. Elizabeth Gautier, Jersey city, N. J., for a potichomanie vase. Diploma.

Penmanship and Gold Pens.

Judges—Hiram Dixon, John Ahern, Leroy W. Fairchild.

John Foley, 163 Broadway, New-York, for the best gold pens. Bronze medal.

T. G. Stearns, 290 Broadway, New-York, for Prince's protean fountain pen. Diploma.

A. H. Wheeler, 835 Broadway, New-York, for the best ornamental penmanship. Diploma.

Herman Geiling, 42 Warren street, New-York, for a very superior specimen of ornamental pen drawing. Diploma.

Henry C. Buck, Sixth avenue, New-York, for a beautiful specimen of card writing. Diploma.

Gold and Silver Plating.

Judges—Ralph G. Anderton, Wm. Miller, Benj. Newkirk.

Wm. J. Miller & Co., 15 Maiden Lane, New-York, for the best gold and silver plating. Large silver medal.

Charters Bros. & Co., 12 Maiden Lane, New-York, for superior specimens of silver plating (a silver medal having been before awarded). Diploma.

Meyer & Warne, Philadelphia, Pa., for silver plated ware. Silver medal.

Wm. J. Miller & Co., 15 Maiden Lane, New-York, for the best plating on steel. Gold medal.

Piano Fortes.

Judges—Herman A. Wollenhaupt, E. T. Root.

Schuetze & Ludolff, 452 Broome street, New-York, for the best piano-forte for tone and equality throughout. Gold medal.

Gross & Hulskamp, Troy, N. Y., for a piano-forte, (the action of this instrument is the best on exhibition.) Large silver medal.

Boardman, Gray & Co., Albany, N. Y., N. P. B. Curtis, agent, 489 Broadway, New-York, for a piano-forte. Bronze medal.

Henry Hansen, 100 Centre street, New-York, for a piano-forte. Diploma.

William Lindemann & Son, 56 Franklin street, New-York, for a piano-forte. Diploma.

Preparations of Natural History.

Judges—T. F. King, Emile Guillaudeu, D. G. Elliot.

John G. Bell, 289 Broadway, New-York, for the best specimens of prepared birds and quadrupeds, (a gold medal having been before awarded.) Diploma.

Francis McCulloch, 289 Broadway, New-York, for specimens of stuffed birds. Diploma.

John L. Bode, 16 North William street, New-York, for preserved birds and quadrupeds, (a silver medal having been before awarded.) Diploma.

Miss Anna Perry, 196 Court street, Brooklyn, for the beat specimens of pressed natural flowers. Diploma.

Refrigerators.

Judges—James Horner, Thomas F. De Voe.

A. S. Lyman, 212 Second avenue, New-York, for the best refrigerators. Large silver medal.

Charles Winship, New Haven, Conn., for refrigerators. Bronze medal.

George Pierce & Co., Broadway, New-York, for refrigerators. Diploma.

Rope, Cordage and Twine.

Judges—Isaac S. Walker, P. A. Decevel.

John Thursby's Sons, 238 Front street, corner Peck slip, New-York, for the best Manilla and tarred cordage. Bronze medal.

W. R. Dutcher, Lansingburgh, N. Y., for the best fine yarn, cords and lines. Diploma.

A. N. Hart, 1153 Broadway, New-York, for the best linen twine. Diploma.

John Roe, Patchogue, L. I., Theodore F. Brett, agent, 103 Maiden Lane, New-York, for the best cotton seine twine. Dip.

Wortendyke Brothers, 20 Beekman street, New-York, for the best cotton cordage and skirt cord. Diploma.

Saddlery and Harness.

Judges—John B. Bull, Robert D. Sterling.

G. & D. Cook & Co., New Haven, Conn., for a set of gig harness. Diploma.

F. G. Ford, 102 Fulton street, New-York, for a model of a patent spring saddle. Diploma.

N. Pullman, New Oregon, Iowa, for an awning frame for a draught horse. Diploma.

School Furniture.

Judges—Henry Kiddle, J. Elias Whitehead, A. Macvey.

The J. L. Mott Iron Works, 264 and 266 Water street, New-York, for the best school furniture, (a silver medal having been before awarded.) Diploma.

Shawls and Muslin Delaines.

Judges—Charles Tuttle, J. L. Sackett.

Waterloo Mills, Almy, Patterson & Co., agents, 59 and 61 Liberty street, New-York, for the best gentlemen's shawls. Silver medal.

John Duncan, Franklin, New Jersey, Bowers & Beeckman, agents, 43 Broadway, New-York, for gentlemen's shawls. Bronze medal.

Hamilton Woolen Co., Southbridge, Mass., for superior cashmeres and muslin delaines. Large silver medal.

Silk.

Judge—G. M. Haywood.

M. Heminway & Sons, Watertown, Conn., S. J. Dennis, agent, 40 Dey street, New-York, for superior sewing silks, tailor's twist and sewings on spools, sewing machine twist embroidery, and knitting silk. Large silver medal.

Sign Painting.

Judges—J. H. Bredenbah, Jr., Richard P. Fosdick, H. Mason Dikeman.

B. Falkenberg, 438 Broadway, New-York, for the best specimen of burnished gilding on glass signs, druggists' bottles, &c. Dip.

Minors' Work.

John Young, apprentice, 77½ Laurens street, New-York, for a specimen of sign painting. Copy of Webster's Dictionary.

Snuff.

Judges—John Gray, B. Lewis, Jr., John W. Chambers.

Leonard Appleby, Spotswood, N. J., J. C. Appleby, agent, 133 Water street, New-York, for superior snuff. Diploma.

Stoves, Furnaces, and Ranges.

Judges—Joseph P. Simpson, Wm. S. Hunt, Lorenzo Moses George Walker.

J. W. Lane & Co., 442 Broadway, New-York, for the best steam heating apparatus. Bronze medal.

Gregory, Leeds and Avery, 94 Duane street, New-York, for hydraulic heaters. Bronze medal.

F. L. Hedenberg & Son, 53 Walker street, New-York, for a hot water furnace. Diploma.

Johnson & Cameron, 374 Broadway, New-York, for Boynton's wood furnace, and Boynton's improved self-clearing and ventilating warm-air furnaces. Silver medal.

Truman Merrifield, 280 Walker street, New-York, for portable hot-air furnace and stoves for heating. Diploma.

Bartlett & Lesley, 380 Broadway, New-York, for a hot-air furnace. Bronze medal.

Bartlett & Lesley, 380 Broadway, New-York, for a portable hot-air furnace with oven attached. Diploma.

Lewis R. Case, 247 West Seventeenth street, New-York, for a portable furnace. Diploma.

Whitney, Sanford & Co., 139 Water street, New-York, for the challenge heaters. Bronze medal.

F. L. Hedenberg & Son, 58 Walker street, New-York, for patent heaters. (A silver medal having been before awarded.) Dip.

Bramhall, Hodge & Co., 398 Broadway, New-York, for Chilson's cone furnaces and stoves. Diploma.

Tompkins & Van Zant, Brooklyn, L. I., for Etnæ heaters. Dip.

E. Barrows, 228 Water street, New-York, for hot-air furnaces and cooking ranges. Diploma.

Charles J. Shepard, 242 Water street, New-York, for the best basement fire-place heater and basement heater stove, (Williams' patent.) Bronze medal.

J. L. Mott, iron works, 264 and 266 Water street, New-York, for a new coal stove. Diploma.

Samuel Pierce, Troy, N. Y., Johnson & Cameron, agents, 374 Broadway, New-York, for bituminous coal burning cooking-stoves. Diploma.

William Clark, 9 Carmine street, New-York, for Empire parlor stoves and cooking stoves. Diploma.

Sidney Smith, 164 Myrtle avenue, Brooklyn, L. I., for radiator parlor stoves. Diploma.

Sager & Dorsch, 211 Water street, New-York, for stoves. Dip.

Newman & Tormey, 320 Fourth avenue, New-York, for fireplaces for burning wood, soft and hard coal. Diploma.

Samuel Pierce, Troy, N. Y., Johnson & Cameron, agents, 374 Broadway, New-York, for the best cooking ranges for coal or wood. Silver medal.

T. S. Merritt, 115 Bleecker street, New-York, for kitchen ranges. Diploma.

Chas. J. Shepard, 242 Water street, New-York, for hotel and family ranges. Silver medal.

Truman Merrifield, 230 Walker street, New-York, for summer ranges and cooking stoves. Diploma.

J. L. Mott, iron works, 264 and 266 Water street, New-York, for ranges for coal and wood. Diploma.

M. C. Hull, 288 Third avenue, New-York, for cooking ranges. Diploma.

R. J. Blanchard, 599 Sixth avenue, New-York, for large ranges and a portable summer range. Diploma.

John W. Lefferts, Brooklyn, L. I., for a patent carriage stove. Diploma.

Whitney, Sanford & Co., 139 Water street, New-York, for the best hollow ware. Bronze medal.

Surgical Instruments.

Judges—D. M. Reese, M. D., Henry G. Cox, M. D., J. M. Carnochan, M. D.

Marsh & Co., 2 Vesey street, New-York, for the best truss and surgical appliances. (A silver medal having been before awarded.) Diploma.

D. Sherman, 182 Broadway, New-York, for a patent truss. Dip.

Palmer & Co., 378 Broadway, New-York, for the best artificial leg. (A gold medal having been before awarded.) Diploma.

B. W. Jewett, Laconia, N. H., Ira Buckman, Jr., agent, 95 Bank street, New-York, for an artificial leg. Bronze medal.

A. A. Marks, 307 Broadway, New-York, for an artificial leg. Diploma.

C. H. Davidson & Co., Charlestown, Mass., for the best self-injecting enema syringes. Diploma.

D. Minthorne, 49 Warren street, New-York, for syphon syringes. Diploma.

Trunks and Carpet Bags.

Judges—John Black, J. Johnson.

C. Waters, 850 Broadway, New-York, for a sole-leather trunk. Diploma.

X. Heurstel, 630 Broadway, New-York, for a very superior valise bag. Diploma.

Lazarus Cantel, 15 West Broadway, New-York, for water-proof life-preserving trunks. Diploma.

Umbrellas.

Judges—John J. Smith, Mark Banks.

Norman Cook, 54 Bowery, New-York, for water-proof umbrellas. Diploma.

Upholstery.

Judges—Samuel Waterbury, W. B. Whiteman, W. F. Platt.

Lippincott & Co., 644 and 646 Broadway, New-York, for Wright's patent spring bed bottom. Bronze medal.

Schroeder & Tuska, 148 William street, New-York, for a patent spring mattress. Diploma.

Gray & Co., New-York city, for patent elliptic spring bed bottoms. Diploma.

Robert G. Eunson, 661 Greenwich street, New-York, for a patent ventilating feather bed. Diploma.

Thomas K. Worl, Hartford, Conn., for an improved adjustable curtain fixture. Diploma.

J. & J. Dixon, 152 East Fortieth street, New-York, for curled horsehair. (A silver medal having been before awarded.) Dip.

H. F. Vandenhove, 141 Houston street, New-York, for a spring folding bedstead. Diploma.

Wigs and Toupees.

Judges—Wm. S. Clirehugh, Wm. Dibblee.

Medhurst & Co., 27 Maiden lane, New-York, for wigs. (A silver medal having been before awarded.) Diploma.

Wood Turning.

Geo. Wilson, 340 Twenty-fourth street, New-York, for fancy turning. Diploma.

Minors' Work.

J. W. Mead, 250 Canal street, New-York, for fancy rosewood turning. Copy of Webster's Dictionary.

Woolen Goods.

Judges—P. F. Randolph, Alfred Edwards.

Union Manufacturing Co., Wolcottville, Conn., John Slade & Co., agents, 157 Broadway, New-York, for the best black doeskins. Large silver medal.

Greenfield Manufacturing Co., Greenfield, Mass., Bailey, Southard & Co., agents, 145 Broadway, New-York, for black doeskins. Bronze medal.

Bailey, Southard & Co., 145 Broadway, New-York, for black doeskins. Diploma.

Union Manufacturing Co., Norwalk, Conn., Bowers & Beekman, 43 Broadway, New-York, for superior felt beaver cloths. (A gold medal having been before awarded.) Diploma.

Evans, Seagrave & Co., Bailey, Southard & Co., agents, 145 Broadway, New-York, for side-striped cassimeres. Bronze medal.

Mystic Manufacturing Co., Mystic, Conn., Willard, Wood & Co., agents, 57 Broadway, New-York, for thread-warp merino cassimeres. Diploma.

Shaw & Co., Wales, Mass., Willard, Wood & Co., agents, 57 Broadway, New-York, for the best satinet. Bronze medal

Hilliard & Spencer, Manchester, Conn., Willard, Wood & Co., agents, 57 Broadway, New-York, for the second best satinet. Diploma.

W. & J. Morrison, 79 Chambers street, New-York, for woollen yarn and wadding. Diploma.

Wm. B. Bend & Co., Lowell, Mass., W. B. Bend, agent, 191 Fulton street, New.York, for the best fancy blankets. Diploma.

Miscellaneous Articles.

Farr & Briggs, 50 West and 87 Franklin streets, New-York, for candle moulds, (a silver medal having been before awarded.) Diploma.

Clinton Wire-Cloth Co., Clinton, Mass., Lee & Co., agents, 309 Bleecker street, New-York, for wire-cloth wove by power loom. Bronze medal.

Newton Copper-face type Co., 14 Frankfort street, New-York, for specimens of copper-faced type. Diploma.

R. Rowley, 59 West Twenty-fifth street, New-York, for excellent specimens of grind and whetstones. Diploma.

A. H. Ogden, New-York, for specimens of fancy glass work. Diploma.

Shedden & Niergaard, 1023 Broadway, New-York, for citrate of magnesia. Diploma.

David Demarest, 40 West Fifty-fourth street, New-York, for a model of a fire engine. Diploma.

J. & Wm. W. Cumberland, foot of Twenty-fourth street, East river, New-York, for excellent metallic machine oil. Bronze medal.

H. Reiferscheid, 289 Broadway, New-York, for compound solvent for dissolving the incrustations formed in steam-boilers. Silver medal.

Clark & Co., 335 Broadway, New-York, for Juven's soap for cleaning kid gloves. Diploma.

Horace Averill, Albany, N. Y., for Lake Huron grind stones. Diploma.

Glen Cove Starch Manufacturing Co., Glen Cove, L. I., Wm. Duryea, agent, 201 Fulton street, New-York, for superior corn starch. Silver medal.

Jesse Oakley, Newburgh, N. Y., office 201 Fulton street, New-York, for German erasive and detersive soap. Diploma.

ILLUSTRATIONS AND DESCRIPTIONS OF MACHINERY, &c. AT THE 29th ANNUAL FAIR, 1857.

THE DESCRIPTIONS ARE FURNISHED BY THE INVENTORS.

AGRICULTUAL MACHINERY.

Wagener's Seed Harvester.

Jeptha A. Wagener, 7 Beekman street, New-York.

This machine simply gathers the seed from the stalks, which seed is easily hulled. The exhibiter claims that a three foot harvester will, with a horse and boy, gather five acres of seed per day; and a four foot harvester, with a horse and boy, will gather eight acres of seed per day. [*A silver medal awarded.*

Bullock's Improved Portable Progressive Power Hay and Cotton Press.

Mechanics' Manufacturing Company, 81 Duane street, New-York.

This press is adapted to all the various purposes for which presses are required.

It is very light, and sufficiently powerful and strong to press a bale of cotton of 400 to 500 lbs.

This press weighs, complete, about 1,200 lbs. The machine, (or working parts,) are made entirely of iron, and of course will not rot or decay.

When this press is used out doors or on the ground floor of a building, it is necessary to rig up some light scaffolding for the workmen to stand upon to tie off the bale, this is the only incon-

venience about this press. The cap is moved off one side of the box, resting upon the sway bars at each end, so that a child can handle it, thus leaving the top of the box open and unobstructed for filling. The wrought iron bars in the centre of the press are so jointed and arranged as to be easily detached from the cap and let down, to allow the bale to roll out when desired. This press will make a bale of hay from 200 to 300 lbs., and is light work for two men. It is also used for straw, paper, rags, wool, &c.

[*A bronze medal awarded.*

Bullock's Improved Portable Progressive Power Hay and Cotton Press.

(MACHINERY No. 1.)

RAILROAD MACHINERY AND FIXTURES.

Boardman's Coal Burning Locomotive.

Horace Boardman, 181 East Thirteenth street, New-York.

This new style of locomotive is already in use upon several railroads, viz: Providence and Worcester, Boston and Lowell,

Boardman's Coal Burning Locomotive.

New-York and New Haven, New Jersey, Lehigh Valley and Illinois Central. The fuel used by it has been mostly bituminous coal; although it is well adapted for anthracite coal, and will burn wood with many advantages over common wood locomotives.

The principal advantages claimed for it by the inventer, are economical use of coal without smoke or sparks and without destroying the furnace and tubing; and placing a large portion of the weight of the boiler near the track.

The arrangement is as follows: The furnace is quite large, the door grate, &c., being similar to those of common engines. A large flue, called the gas chamber, extends horizontally from the upper portion of the furnace over the tube box, to the front end of the boiler; the bottom of which flue is the upper tube shut; the lower tube shut being as low as the bottom of the furnace.

An open space is left between the tube-box and the furnace for the axle of the drivers, so that both the furnace and the tubing portions of the boiler are placed near the track; thus insuring steadiness in running, with much less injury to the road and the locomotive than otherwise. The gas chamber is divided at about two-thirds of the distance from the furnace to the front end of the boiler, by a hollow diaphragm, through which atmospheric air is admitted into the gas chamber, and causes therein a perfect combustion of the smoke and combustible gases.

The course of the flame and draft is from the grate to the upper part of the furnace and into the gas chamber, thence down through vertical tubing to the ash pan, thence along and up through tubing and the chimney hole of the diaphragm, thence horizontally to the chimney.

The tubing of this boiler is not liable to become clogged nor be destroyed by the direct action of the heat, the arrangement being a large number of short vertical tubes instead of a small number of long horizontal ones as in common locomotives.

The use of coal as fuel for locomotives is now attracting much attention; its importance is seen from the fact that estimating a ton of coal and a cord of wood at the same price, the cost of fuel is reduced full fifty per cent by the successful use of coal instead of wood.

There are several reasons why coal cannot be used with advantage in common wood engines; the most important being the destruction, in a short time of the tube sheet, tubing and interior of the furnace; the liability of the tubing to clog with fine coal, and the escape of a large portion of the fuel in the form of smoke and gas; which objections are claimed to be entirely overcome in the use of the locomotive under consideration.

From several certificates in relation to this coal burner before us, we select the following from Mr. John B. Winslow, Superintendent of the Boston and Lowell railroad:

Boston, March 6, 1858.

I have been acquainted with the Boardman Coal Burning Locomotive Boiler for the last three years. I consider it superior to any coal burning locomotive that I am acquainted with. The one that we have in use has given entire satisfaction in all respects. The following is the cost per mile for running with coal for the months of December 1857, and January 1858. The coal costs per 2,240 pounds, on the tender, $6.

December, cost per mile for fuel,	$10\frac{64}{100}$	cents.
January " "	$9\frac{86}{100}$	

The wood locomotive, to perform the same labor, (it run the freight,) costs from 18 to 21 cents. The wood on the tender costs $5.75 per cord. [*A silver medal awarded.*

Hilliard's Lock Joint,

For uniting bars on railroad tracks, dispensing with joint ties, railroad chairs, and other support and fastenings at the joints. J. R. Hilliard, Paterson, N. J.

Men of experience and adepts in charge of track admit there is more expense at the junction of the rails, and more hazard, than at other points. Notwithstanding the expense incurred, there will be an uneven surface at the joints, by the present method. Heavy joint ties and railroad chairs are insufficient. The consequences are most destructive to engine machinery, cars, and even the track itself. To obtain a smooth, continuous surface of rail, many inventions and improvements have been made.

Hilliard's Lock Joint.

The inventor informs us that the Lock Joint was first applied to several bars in the track of the New-York and Erie railroad, at Huyler's station, four miles south of Paterson, about eight months ago. Several bars were afterwards introduced in the track of the same road, between Huyler's and Paterson stations, around the "Weasel curve," one of the most acute on the whole line. Several bars have also been laid down upon the New-York Central railroad, at Syracuse, Rochester and Pittsford. All these portions of track are laid without joint ties and railroad chairs. No support other than is afforded by the joint, is essential or necessary. While the joint resists downward and lateral pressure, the expan-

sion and contraction of the bars by change of temperature is provided for. One rail cannot be raised above or be depressed below another; the track must present a smooth, continuous and even surface. In proof of this, persons interested are requested to examine the track before referred to. To show the economical value and utility of the improvement, the following estimate is presented for consideration, by the exhibiter.

The heaviest rail, now in use on most railroads, weighs about 75 lbs. per yard, or 132 tons per mile. The cost, at $80 per ton, is $10,560 per mile. Rails last, on an average, about eight years, at the expiration of which the iron is worth say one-half its original cost, or $40 per ton. Thus the annual depreciation is $660 per mile. It is a well authenticated fact, that the iron gives way first and principally at the joints, on account of the inequalities presented to the wheel. It is not an improbable supposition to say, that by means of the Lock Joint improvement, the rail will wear two years longer, making a saving of $1,320 per mile, or for 460 miles of track, $303,600 per annum for two years.

Again, there are 600 chairs to the mile, weighing about 25 lbs. each. By dispensing with these, the sum of $450 per mile will be saved, or on 460 miles of road, $207,000. Add to this six spikes to each chair, valued at $101.25 per mile, or $46,576 for 460 miles of track. These chairs and spikes are renewed about once in four years.

There is still the difference in time required to lay the two kinds of track, which exhibits a difference in favor of the improvement of $12,000 for 460 miles of track.

The cost of keeping track in repairs is estimated at $1.25 per day per mile, or $179,975 per annum for 460 miles. Of this sum, at least 25 per cent may be saved, amounting to $44,993 per annum.

The estimate for cutting and fitting the joint upon the old rail, after it is prepared, is 40 cents per joint. The new rail can be fitted where it is manufactured more advantageously and at a cheaper rate, making it preferable in point of economy over the present method. [*A bronze medal awarded.*

(MACHINERY No. 2)

MACHINES FOR WORKING IRON.

Dick's Hand Punch.

Hadley Falls Co., Holyoke, Mass., W. J. Buck, agent, 48 Dey street, New-York.

The above cuts are a front and side elevation of D. Dick's Hand Punch, No. 2, for boiler plates, &c. This machine weighs about 1,750 lbs. The exhibiter claims that it will punch eleven-sixteenths of an inch hole through three-eighths of an inch iron, sixteen inches from the edge, with *one man's power*. No. 1 Hand Punch, of the same pattern and style, weighs about 2,300 lbs.,

will punch a three-quarter inch hole through half inch iron, sixteen inches from the edge, with two men's power. No. 4 Punch, of the same style, weighs about 290 lbs., and will punch a three-eighths of an inch hole through quarter inch iron, five inches from the edge. No. 5 Punch, of the same style, weighs about 100 lbs., and will punch one-quarter inch hole through three-sixteenths of an inch iron, five inches from the edge.

Dick's Saw Gummer.

Hadley Falls Co., Holyoke, Mass., W. J. Buck, agent, 48 Dey street, New-York.

The above cuts are a front and side elevation of D. Dick's Saw Gummer, for all kinds of mill and circular saws, of any thickness. Weight, about 230 lbs.

Dick's Power Press and Shears.

Hadley Falls Co., Holyoke, Mass., W. J. Buck, agent, 48 Dey street, New-York.

The plate is a front elevation of D. Dick's Power Punch and Shears, No. 1, weight about 9,000 lbs. This machine will cut in two a bar of iron eight inches wide and one inch thick, and round or square bars one inch and three-quarters or two inches diameter, and punch a one inch and a quarter hole in one inch iron, punch and slab hexagon nuts for one inch bolts, or punch and cut square nuts for one and a quarter inch bolts.

[*A gold medal having been before awarded—Diploma.*

DICK'S POWER PRESS AND SHEARS.

Snow, Brooks & Co., Punch Presses.

Snow, Brooks & Co., Meriden, Conn.

Back Geared Single Action Press.

Geared five times. Tight and loose pulley fitted to press, so that it may be run from a main line of shafting. Weighs 4,200 lbs. Punch raises from one to one and a half inches.

Presses weighing from seven to fifteen tons, of the same style of No. 3, with or without gear, built to order.

Power or Hand Single Action Press.

Weighs 800 lbs. Punch raises one inch.

No. 1. Double action.

No. 2. Single action power press. Weighs 1,450 lbs. Punch raises from one to one and a half inches.

No. 2. Double action.

No. 3. Single action power press. Weighs 3,000 lbs. Punch raises from one to two inches.

No. 3. Double action.

Hand power can be attached to No's 2 and 3.

[*A silver medal awarded.*

Brombacher's Boiler Plate Cutting Machine.

Jacob Brombacher, No. 1 Hague street, New-York.

[*A bronze medal awarded.*

Rust's Patent Presses.

S. Rust, 392 Greenwich street, New-York.

The frame of this press is as F, into which two sectors are so arranged as as to have the great advantage of both the toggle-joint and the eccentric, separately and combined, as shown at D and E, by means of the lock at D, and also of pulling out the punch with ease and certainty, by simple eccentric plates on the bottom part

S. RUST'S PATENT PRESSES,

(Driven by Hand or STEAM Power,) for Punching and Shearing Iron, Saw Gumming, Embossing, Stamping, and Copying.

of the sector, as at A, which sector is hinged to the piston, and the eccentric plates, pressing on plugs or bearings, on the press frame, as at B, pull out the punch by the reverse motion of the lever. After thus drawing the punch, the whole works are most beautifully carried up to their places by mere slight rods, passing through the pillars of the press, with simple India-rubber balls on top, at C. Both sectors work on good tempered cast steel bolts, which are durable, and fully retain their centres. The press is simple, and will not get out of order; and so powerful, that an ordinary man can easily punch 11–16 hole, or more, through one-quarter inch iron with one finget only, by taking hold of the bare lever.

[*A silver medal having been before awarded—Diploma.*

Bottoms' Watch Makers' Lathe.

Jas. M. Bottom, 169 Broadway, New-York.

This lathe is adapted to every style of work connected with the manufacture of watch movements, such as making and setting watch jewels, cutting and finishing chronometer, duplex and lever pallets, nurling and glossing wheels, graining plates, glossing hollows, facing pinions, turning and pivoting cylinders, balance staffs, pinions, &c., polishing every description of steel and brass work connected with the English or Swiss movements.

[*A gold medal having been before awarded—Diploma.*

Stephens' Pivoting Universal and Jeweling Lathe, for Watchmakers.

G. M. Bodine, agent, 22 Maiden Lane, New-York.

"This is one of the most complete lathes for watchmakers ever offered to the trade. It combines in one instrument all that is useful or desirable in the lathe way, and is adapted for doing the work of a universal jeweling and pivot lathe; the graver for turning pivots being held in the Slide Rest, instead of the hand. It is strong, and not liable to get deranged, and so simple that any ordinary workman can turn the smallest pivots as perfectly as the most experienced workman by the old method. Pivots can be turned with a graver held in the hand, as on the ordinary lathes, when desired.

"The end of the Mandril has an inside and outside screw; the outside screw is for the Pivot Chuck and Universal Head; the nside can be used for ordinary job work and small turning, and a variety of Chucks may be fitted to facilitate the finishing work.

"The Slide Rest is on an entirely new principle, combining unusual strength and firmness with great simplicity. The traversing part moves on an arc, and rises as you cut from the centre.

"C is a cylindrical bar, projecting six inches beyond the Head, on which the Slide Rest and common turning rest T moves.

"D is a cylinder, with socket, to receive cutters for turning and jeweling; also centres for uprighting and turning, from two centres, moved back and forth by the large screw at the end.

"E is a cutter for turning pivots, in its place in the socket.

"P is a reciprocating screw, carrying the cutters to and from the centre.

"Fig. 2, is a Chuck for turning pivots, having a screw cut inside of the shaft, to fit a corresponding screw on the Mandril of the lathe, and has a part removed, to show the position of the back centre H, with a wheel and pinion chucked for turning.

"H is a back centre, with a conical hole to receive the end of a pinion, and is fitted so as always to present a true centre, and is sufficiently tight to retain its position in moving back and forth, to accommodate the different lengths of pinions.

STEPHENS' PIVOTING UNIVERSAL AND JEWELING LATHE, FOR WATCHMAKERS.

WOODBURY'S PLANING, TONGUING AND GROOVING MACHINE.

WOODBURY'S PLANING, TONGUING AND GROOVING MACHINE.

"K and L are accurately fitted Steel Jaws, moving in dovetail grooves, lengthwise, the face of the Chuck, by turning the screws M, N. The ends of these jaws are square, with a small notch across the face to receive the pinion, and is adjusted to centre by moving the above screws.

"Fig. 3, is a Universal Head. S, S, S, are the usual Clamps for holding plates. It has a shaft on the reverse side, same as the pivot chuck, and is secured on the Mandril in the same way."

[*A bronze medal awarded.*

(MACHINERY No. 3.)

MACHINES FOR WORKING WOOD.

Woodbury's Planing, Tongueing and Grooving Machines.

James A. Woodbury, Winchester, Mass.

These machines are got up with patent expansion feed roller gears, upon each end of the feed rollers, so as to plane from one-fourth of an inch to five inches in thickness, without any change of gears. Patent double adjustment of the edge cutters, so as to plane, tongue and grove upon each side the machine. Patent mouth-piece presser bars upon both the surface and edge cutters, which entirely prevent all possibility of tearing either the surface, tongue or groove, upon any kind or quality of lumber. Double side rods, and indexes so as to adjust the edge cutters at the feed end of the machine. Composition boxes. Gum metal edge cutter cylinders.

There is in these machines, aside from the above improvements, everything that there is in any Woodworth machine.

These machines are organized for simplicity of construction, convenience of adjustment, strength and durability.

[*A gold medal awarded.*

Jones & Crowell's Lightning Planer, Tonguer and Groover.

B. M. Crowell 5 Worth street New-York.

The engraving represents one of Jones & Crowell's planing machines, which combines all the valuable points of the Woodworth planer, with additional improvements. The points of superiority here alluded to, are as follows: The machine is self adjusting; it will plane stuff from one-eighth of an inch to seven inches in thickness, on either one or both sides of the board, and may be

Jones & Crowell's Lightning Planer, Tonguer and Groover.

changed from one to the other in half a minute; it will plane twenty-five thousand feet per day; it is compact and easily kept in order; the knives are readily got at to sharpen or regulate.

A superior tonguer and groover furnished with the planer when desired. [*Large silver medal awarded.*

Dennison's double cylinder Rotary Bed Planing Machine.

C. H. Dennison, Green River, Vermont.

This machine is constructed with an iron revolving bed, and polished on the upper side, raised to a proper elevation on an iron frame, and with two sets of horizontal cutters lying directly

DENNISON'S DOUBLE CYLINDER, ROTARY BED PLANING MACHINE.

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above the bed, one on each side, and two feed rollers, one fluted and the other smooth, attached to each set of cutters; the rollers and cutters are raised or lowered by a simple gearing on each side below the bed; the rollers revolve the same way as the bed, and on this account the two sections are fed from opposite sides of the machine.

The advantages claimed for this style of machine are—

1st. The bed revolving with the rollers the lumber is carried through the machine with a great reduction of friction in comparison with those machines with stationary bed, and consequently there is a great saving of power.

2d. This planer is admirably adapted to working stout stuff for boxes and panels, curved and crooked stuff for chairs and for carriage makers' use, &c., and at the same time works equally well in long stuff; it is supplied with pressure bars placed between the feed rollers and edge cutters, prevents the tearing upon any kind or quality of lumber.

3d. The machine being fed from both sides, the two men commonly needed to run a planer can run through two boards or pieces at the same time; and as the gearing of each side is entirely separate, the planing may be of different quality and thickness.

4th. The machine is adapted to the finest kind of work, on which it leaves an excellent finish. It will plain any kind of stuff one-eighth of an inch thick up to four and a half inches, perfectly smooth, or any length from three inches upwards.

This planer is remarkable for its simplicity of construction, convenience of adjustment, strength and durability, and not liable to get out of repair. [*A gold medal having been before awarded, Dip.*

Smith's Wood Planing Machine.

H. B. Smith, Lowell, Mass.

This machine is very compact, is built entirely of iron and steel. The cylinder is made of wrought iron with cast steel shafts, and is capable of being run at a high speed. The whole machine for feeding and planing various thicknesses of work from one-eighth to four inches, is adjusted by a single screw, and as there is an index which shows the exact thickness it is set for, is consequently very quickly adjusted for any thickness required. The

arrangement for belting is such that it may be belted from above, or below the machine, thus giving any desirable length, without taking up room in the shop for a horizontal belt, which is needed by the operator, while feeding in short lumber to be planed. It has a very strong feed, which is sure on damp or dry lumber, and is built in the most thorough and substantial manner in every respect. [*A diploma awarded.*

Dale's Universal Planing, Moulding and Sash Machine.

John D. Dale, Philadelphia, Pa.

The inventor furnishes the following description of the work done by this machine:

1. Truing or taking boards, planks and other carpenter stuff out of wind and dressing up timber of any size under fourteen inches thick and twen y-two inches wide.

2. Planing, tongueing and grooving boards and planks.

3. Making boards, planks, &c., into several mouldings at once, either of the same or various patterns, and separating the same.

4. Making boards, planks, &c. into sash stuff and tenanting the same.

Dale's Universal Planing, Moulding and Sash Machine.

5. Doing other tenanting work.

6. Working circular mouldings and doing circular work of every description.

This has been effected by constructing a machine in the compass of which is contained all the apparatus necessary for effecting any of the above mentioned purposes at the will of the operator, and employing very little (if any) more machinery than is

employed in machines made for performing only one of the operations above enumerated.

As each one of these, by the methods now in use, requires a separate and expensive machine, it is very obvious that one which in itself is capable of performing all of them, possesses every conceivable advantage over others, both as respects economy of time, room and money, as well as superiority of work. In addition to this, the operations of working circular mouldings and of making and tenanting sash stuff cannot so well or so readily be prepared by any other machine, as they can by this.

With this machine, the time and labor now required to cut and tenant sash stuff by those in ordinary use, and the numerous handlings which are made necessary, are all dispensed with. To tenant and cut a plank of the requisite length into as many sash pieces as its width will allow whether they be few or many requires but three handlings.

An entire board is worked into mouldings of the same or various patterns, and each moulding separately divided, at one and the same operation, with a rapidity inconceivable to those who have not witnessed it.

An entire board or plank of any width is accurately trued or taken out of wind throughout its whole length at one operation.

The construction of this machine and the consequent readiness with which the carriage can be used either as a vibrating or as a continuous feed, and the various parts of the apparatus made to accommodate themselves to the size of the stuff of any thickness from half an inch to fourteen inches, and of any width from an inch to twenty-two inches, enables it to be employed for the purpose of planing, squaring or truing the large pieces of timber used for floor joists, &c., with the same rapidity and facility as planks or boards for flooring.

The peculiar characteristic of this invention, is the arrangement and disposition of its parts, which, while they are as few and simple as those of any one of the machines which do but one variety of work, are so constructed and put together, that at the pleasure of the operator the entire nature of the machine is instantaneously and completely changed, and those portions which are not immediately and directly in use, can be moved out of the way so as not

to interfere with the operator, or such portions of the machinery as are actually in operation.

The means by which this novel and desirable arrangement has been so successfully effected, are in themselves extremely simple and devoid of complication, and will be readily comprehended and appreciated by the practical machinist, upon the most careless inspection of the working model, to which attention is earnestly requested. [*A diploma awarded.*

View of Moulding Cutter Head and Plank, part cut and part wrought.

Smith's Moulding Machine.

H. B. Smith, Lowell, Mass.

This machine is something new, and is designed for doing a great variety of work, such as sticking sash, sticking mouldings of any shape, raising panels, planing blind shades and rounding the edges at the same time with the grain of the wood, grooving door stiles, or rails, and jointing the edge at the same time, &c. It is built entirely of iron and steel, the cutter shafts all cast steel, consequently stands with more firmness than any wooden machine. The frame is cast in a single piece, so that it must always remain true, and the table is gibbed on to the frame, so as to be firm, and moved up or down by a single screw, with crank. It is altered without set screws to set up every time, thus saving time in adjustment. This machine is intended, if desired, to plane three sides at a time, having three rotary cutter heads, one above the table, like a sash machine, which lays horizontal, and two upright ones, by the sides of the table, which are so connected that one of

Smith's Moulding Machine.

them may be moved up or down, out or in, with screw and crank, according to the work to be done, and at the option of the operator. [*A diploma awarded.*

Smith's Power Mortising Machine

H. B. Smith, Lowell, Mass.

These machines are compact, being built entirely of iron and steel, take up but little room, are simple and durable, and have acquired the enviable reputation of being the best machines in use, giving perfect satisfaction wherever used. They run without noise, with no jar on the foot, and the chisel is reversed by power, applied by friction, operating instantly, the chisel always taking care of itself, with no loss of time to the operator, and with no possibility of breaking the machine, they may be run any desired speed with perfect safety.

Size No. 2, is intended principally for door manufacturers, and is capable of mortising any size of stile, or rail, ever required. It is also sufficiently heavy and strong, and suitable for mortising hard wood, such as bedsteads, &c., weighs about 700 pounds, and should be run about 450 strokes per minute.

Size No. 3, is intended for mortising sash and blind stiles, or any light work, thereby taking the place of all foot machines,

Smith's Power Mortising Machine.

and does the work nicer, and at least three times as fast, with much less labor to the operator. It weighs about 350 pounds, and should be run about 500 strokes per minute.

[*A large silver medal awarded.*

Wright's Patent Scroll Saw.

Lysander Wright, 230 Market street, Newark, N. J.

The points of superiority claimed in Wright's Patent Scroll Saw are:

1. The manner of connecting the saws with the machine. This is simply done by slipping one end of the saw through the table, and hitching it on to the cross-head at the top of the pitman, and hitching the other end to the bottom of the cross-head, in the slides above the table. A great deal of time is saved by this arrangement, especially in sawing open work, for the saw is instantly changed from one place to another.

2. The mode of straining the saw by a spring above, is worthy of particular note. This gives a clear table for sawing work of any length.

3. The saw and spring being attached to different sizes of pulleys, the saw to the large one in the centre, and the spring to the smaller ones on each side, permits the saw to have all the stroke required, while the spring only moves about one-third the distance. On this account the spring may have any degree of strength necessary, and vibrate much more rapidly than it could be made to do, if it was required to traverse the whole distance the saw moves. Again, the slight motion of the spring saves the trembling of the building, which is so unpleasant where other saws are in use.

4. The simplicity and compactness of the head, is a valuable peculiarity. It embraces the foot, raised or lowered by the gearing at the top, for holding different thickness of stuff; the revolving guide block, with slots in the outer edge, in which the saws of any width are held steady while in operation; the slide, hung on a pivot at the upper end of the shoe, and held by a set screw near the bottom, in which slide the cross-head, to which the saw is attached, is made to move. If the bottom of the slide is thrown forward, the saw, in passing down the plane, strikes ahead; thus, for sawing fast, any desirable amount of rake is given to the saw. The whole head may be raised or lowered for saws of any length, by loosening a set screw in the back of the post.

5. The saws are not liable to be broken by the pin in either end giving way; for if the upper pin fails, the saw drops through

under the table. If the lower one breaks, the saw is drawn up by the spring above the table, and receives no other injury.

[*A silver medal awarded.*

McNish & Butler's Stave Machine.

McNish & Butler, Lowell, Mass.

This machine is capable of dressing and jointing staves of any size, from the smallest to the largest that are used, by an ingenious arrangement of its parts, which admits of their ready adjustment. We will endeavor to describe them, so that they can be understood by parties acquainted with the subject.

The faces of the stave are dressed by revolving cutters, the outer one of a concave and the inner one of a convex form of arcs, suited to the diameter of the cask or barrel to be made, which are adjusted to any desired thickness, and which are driven at a high

rate of speed. The edges of the stave are jointed by cutters on either side of the stave, attached to upright shafts, which stand in a radial line to a centre, whose distance is equal to the radius of the circle of the cask, and which have a sidewise movement, to enable the cutters to be moved from each other as the stave passes between them, as far as the centre of its length, and towards each other, as it passes from the centre to its opposite ends, to give to it the requisite arc to produce the "bulge," when the staves are "set up." The cutters maintain their radial line while jointing, so that the staves are cut to the exact bevel required to make a tight joint when they are made into barrels or casks, and they can be adjusted with great facility to joint staves of all widths, from one and a half to six inches, and of lengths from twenty-four to sixty inches, with perfect exactness. The staves are laid upon the bed of the machine by hand, and are then carried by the feeding movement to the jointing cutters, and from thence to the dressing cutters, being guided in their progress in a direct line, to prevent "winding," by a simple arrangement; so that all the hand labor required in the operation of the machine is simply to lay the staves upon the bed.

It will be noticed, that the staves dressed by this machine are straight upon their face, and require to be bent into shape when they are set up; but it is claimed by the inventor, and the statement is substantiated by practical men, that the saving in time effected in setting up the steamed and bent staves, does not equal their increased cost, and the straight stave is preferred on that account.

The operations of champering and crozing the staves are performed in another machine, invented by Mr. McNish, into which they are carried as they are finished in and leave this one.

[*Large silver medal awarded.*

The Livermore Patent Barrel Machinery.

Wm. V. Studdiford, 49 Wall street, New-York.

These machines work up all kinds of sound materials, regardless of variety. Knots and nurls present no difficulty. Wood is worked more like a metal than a fibrous substance. A spurious or an unsound article cannot be employed. Doety materials, or

wood effected by dry-rot, is immediately detected, and must be rejected. Hogsheads, barrels, kegs and firkins are manufactured identically equal, hence all the difficulties of stowage are overcome The ultimate strength of barrels and casks is increased at least twenty-five per cent., and yet less material is employed and none wasted; the work of the cooper is made to assume its maximum density and durability.

Every two staves are exactly alike, and each stave is symmetrical, and formed with mathematical accuracy, so much so, that the contents of a barrel or hogshead may be accurately determined from the measurement of a single stave. Casks retain a permanent form, perfectly air-tight, water-tight and flour-tight.

If fifteen, or any other number of Livermore's equal and symmetrical staves form a barrel, any set may be selected at random. The use of truss or gauge hoops are not required. A given number of staves, placed promiscuously, form a cask mathematically accurate, and do not require being marked.

In order to form an adequate idea of the importance of this invention, patented in this country and in Europe, it should be considered that the wheat and other grains raised in the United States and the Canadas would require, in transportation, nearly a hundred millions of barrels and casks annually; while in Europe, more than a thousand millions of barrels, hogsheads and casks are required annually.

The invention consists of three separate machines, viz: A Shaper, Jointer and Head-cutter. The staves, after being sawed and seasoned, are planed on one side with any ordinary planing machine, reducing them to a uniform thickness. They are then passed through the shaper, which process gives them the proper form.

In the manufacture of casks, the staves are heated for four or five minutes, previous to passing through the shaper, which enables them to retain their firmness and required shape; but this is not necessary in the manufacture of ordinary barrels. The staves are then placed in the jointer, where, by an ingenious process, they are jointed, chamfered and crozed, and finished in the most perfect manner, ready to be set up at any future time. The head-cutter

is very simple in its construction and design; it turns out a perfectly finished head, that will fit exactly the square groove in the staves, entirely superseding the necessity of lining hoops.

One shaper, four jointers, and one head-cutter, with the labor of eight men and five boys, will turn out staves and heads for five hundred barrels a day. These staves and heads, in transporting, occupy not more than one eighth the space of a barrel set up, and hence the expense is correspondingly diminished. When they arrive at the place of destination, they require but small storeroom, and need not be set up till wanted.

Fig. 1. The Shaper.

The above figure represents the Shaper, which consists of a series of five pairs of convex and concave rollers, so arranged with respect to each other, and so shaped, as to give the staves the requisite curve, and at the same time compressing the wood in such a manner that the form given to the staves is permanently retained. The first roller is slightly convex, the next has greater convexity, and this convexity increases throughout the series, the last of the series completing the required transverse section and perfectly circular curvature of the stave. Above these rollers, and curved so as to conform to the convexity of the lower series, is another series of rollers. The lower series are arranged to conform to the required longitudinal curve for the staves, and may be adjusted by set screws; the upper rollers are adjusted, and their relative distance from the lower series fixed also by set screws, so as to give the requisite compression to the stave blanks

in proportion to their thickness. The transverse curvature of the stave is given by the concavity of the upper and the convexity of the lower series of rollers, and can be varied to any required extent by changing the rollers for those of greater or less convexity or concavity. The longitudinal curviture of the staves may be increased or diminished by operating on set screws before mentioned.

A and B are the staves passing in through the rollers, from which they receive their shape, as shown by a stave leaving the machine at C; the stave is shown more plainly at D, *Figure* 2. The belts, D D, *Figure* 1, drive the machine, and require about two-horse power.

Fig. 2. The Jointer.

A is the outside clamp, B the inside clamp, C the handle, by which the clamp B brings the stave D in the position it holds in the barrel, cask, or hogshead, when set up. The connected parts, A and B, holding the stave D, then are made to pass by the saws, E E, by which the staves are cut the right length, and also chamfered, crozed, and howelled. The clamp is then pressed towards the jointer F, which brings the stave in contact with the knives finishing that side of the stave. It is then passed back to the other side of the jointer G, which finishes the other side; and then by raising the handle, C, the stave is released, and passes through an opening in the floor.

Fig. 3. The Head Cutter.

THE JOINTER.

The Head Cutter.

A is the wood previously planed down to the required thickness, and held in its position by the plate B, in connection with a lever, C, operated by the foot at D. The wood A, out of which the head has to be formed, and the plate B, are made to revolve by the belt E. The head is then cut and chamfered on both sides at the same time, by the knives F and G, operated by a lever.

About one-half of one-horse power is required to operate the Head-Cutter.

The *Heads* fit firmly with mathematical exactness, and are formed so much alike, and equal, that it is impossible to misplace them.

Staves for shooks, manufactured by this machinery, require no marking, but a given number of staves necessary for a cask may be set up promiscuously, and they form a perfectly tight joint; while, by any other process truss hoops must be employed, and each stave marked, so that when set up for use, they must occupy the relative position given to it by the manufacturer. The experience of commerce demands for general packing purposes precisely the qualities which the cooper attempts to give a barrel or cask, namely, convenient size for handling, roundness for rolling, projecting chimes to be seized in hoisting, and swelled bulge to allow of tightening by driving the hoops. Economy demands that the whole should be wood in separate pieces; but a due regard to efficiency and tightness requires a high degree of perfection in the workmanship. [*A silver medal awarded.*

Waymoth's Patent Spool and Box Lathe.

A. D. Waymoth, Fitchburgh, Mass. Lysander Wright, agent, Newark, N. J.

This lathe is adapted to turning every variety of thread spools, druggists' boxes, tassel moulds, wagon hubs, tool handles, various kinds of toys, &c. [*Large silver medal awarded.*

Waymoth's Patent Spool and Box Lathe.

Wood's Improved Self-feeding Shingle Machine.

Seeley & Chism, 137 Nassau, corner of Beekman streets, New-York.

Wood's Self-feeding Shingle Machine.

"The attention of those interested in the manufacture of shingles, and the public generally, is most respectfully invited to an examination of the merits of this improvement for cutting shingles; in full confidence that all who will take the trouble to witness its operation, will be thoroughly convinced of its utility, as well as its superiority over every other shingle machine heretofore in use. It is constructed on an entirely new principle, at once simple and compact, can be readily attached to steam, water or horse power, or may be operated by hand; in fact, it is adapted to every circumstance in the manufacture of shingles, and jointing them ready for use.

"It requires only about one horse power to propel this machine with sufficient force to cut one shingle per second, and any man

of ordinary capacity can manage it with perfect ease, as there is no machinery about it requiring any mechanical skill whatever in its management or operation." [*A bronze medal awarded.*

Boardman's Patent Blind Wiring Machine.

Byron Boardman, Norwich, Conn.

Blind makers have long felt the necessity of a machine for wiring blind rods, which we have never before been able to offer with the confidence that it would be a machine of utility and profit. This machine is simple in its construction and easily managed; is portable, and may be secured to a bench or any convenient place, by one simple bolt. The principles of the machine consist of guides for conducting the staples to the rod, a device for feeding the staples between the guides, a driver for forcing them into the rod, and a device for moving the rod forward any required distance as each staple is driven, and by simply working a lever by the hand or foot, will space off and set from sixty to eighty staples per minute, in the most perfect manner. This machine is adapted to all the different sizes and shaped rods in general use.

To feed by hand, this machine will set from forty to fifty staples per minute.

The essential parts of the machine consist of guides, for conducting the staples to the rod.

2d. A device for feeding the staples between the guides.

3d. A driver for forcing them into the rod.

4th. A device for moving the rod forward the required distance as each staple is driven.

The staples are taken from a box placed in an inclined position, by passing the point of a strip of sheet iron up through them, until a sufficient quantity has been taken up, the point is then applied to the inclined "staple bar," and the staples allowed to slide down upon it. At the lower end of the staple bar, and betwixt the guides, there is only room for one staple to pass at a time, and when the driver is brought down, it just clears the end of the staple bar, and forces a staple into the rod, which slides in a suitable bed underneath the guides.

The device for feeding the rod forward the required distance as each staple is driven, consists of an elbow lever, actuated by a spring, and carrying at one end a bar, which comes in contact with the last driven staple, and moves the rod forward until the staple comes against the stop. This stop is adjustable, to suit different widths of slats; the guides also are adjustable, to fit different sizes of staples. [*A bronze medal awarded.*

Howe's Patent Governor, for Stationary and Marine Engines, Water Wheels and Motors of every kind.

Frederick W. Howe, Newark, N. J.

(A) represents a hollow round column on a hollow square stand, and (L) a driving pulley, driven by a belt from the engine or other motor, but for which other gear may be substituted. This pulley is on a horizontal shaft (L′), having its bearing in the base of the column which carries a bevel cog wheel, (K) which engages corresponding bevel cog wheel (K′), turning loosely on the hub of a vertical stand (R), through which the shaft (F) passes in the centre of the hollow column.

The lower end of this shaft rests on a step (Q), in the base of the column. It is properly journaled to the stand (R) in the base, and also at top in the upper end of the column, and is prevented from rising by a nut (y) and washer (Z), below the stand (R).

Howe's Patent Governor.

To this shaft is secured a bevel cog wheel (H), which receives motion from the driving pully (L), through the bevel wheels (K) and (K), before described, the latter of which (K') has attached to it another bevel cog wheel (I'), which engages a bevel wheel (I), that engages the wheel (H), on the said vertical shaft (F).

The bevel wheel (I) is on an arm of a horizontal hub (S), which turns freely on the hub of the vertical stand (R), and this hub carries a horizontal cogged segment (S′), the cogs of which engage the cogs of rack (M), adapted to slide in suitable ways in the base of the column. When the hub (S) of the bevel wheel (I) is held in a fixed position by the rack (M), the rotation of the driving pulley which imparts motion to the bevel wheel (I′) by the wheels (K) and (K′), rotates the shaft (F) in the reverse direction of the wheel (I), because the motion imparted by the wheel (I′) to (I) is then all transmitted to the wheel (II) attached to the shaft; but if the shaft (F) be held so that it cannot rotate, and the hub (S) on which the wheel (I) is mounted, be free to turn on the hub of the vertical stand (R), then all the motion imparted to the wheel (I) by the wheel (I′), will cause the said wheel (I) to revolve about the shaft (F).

For the purpose of holding the axis of the wheel (I), a chain (O) is attached to the rack (M), passes over a guide pulley (N), and has a weight or spring (P) attached to it, which weight or spring tends constantly to force the rack in one direction, and to resist the tendency of the hub (S) to be turned by the driving power which rotates the wheel (I), and therefore so long as the power required to turn the shaft (F) is less than the power required to lift the weight or spring (P), the shaft (F) will be rotated by the driving pulley (L) through the intermediate gearing, but as soon as the resistance on the shaft (F) is increased beyond the power required to lift the weight or spring (P), the wheel (I) will begin to travel or revolve about the axis of the shaft (F), which will cause the rack (M) to be moved in the direction to lift the weight or spring (P), and to the extent of this motion the shaft (F) will be retarded. On the upper end of the shaft (F) there is a cross-head (W), forming two horizontal arms, to the ends of which are hung, by joint pins (EE), the rods (TT), of the usual governor balls (UU), which are prevented from falling below a certain elevation by spurs (áá), which strike against stop pins (gg), on the arms or cross-head (W).

The under face of the spurs (áá) are cam-formed, and act on the upper end of a cap (c), which is free to slide up and down on

a shaft, so that when the balls (UU) are thrown out by centrifugal force, the spurs (áá) force down the cap (c), which rests on a helical spring (c′) in a cup in the upper end of an inverted cone (B), attached to and rotating with the shaft (F). The conical surface of the inverted cone (B) is fitted to a conical cavity in the upper end of the column (A).

The sliding rack (M) is to be connected in any suitable manner with a throttle valve, or with the apparatus which closes the cut-off valves of a steam engine, if the governor is applied to a steam engine, or with the gate which lets in the water on to a water wheel, if applied to govern the speed of water wheels.

From the foregoing it will be seen, that whenever the speed of the engine is too great, the balls (UU) will be thrown out by centrifugal force; this will gradually compress the helical spring, and by degrees increase the friction of the cone (B) with the conical cavity of the column; and as the cone (B) is feathered to and turns with the shaft (F), this gradually increasing friction will gradually retard the motion of the shaft (F), and as this is gradually retarded, the hub (S) is gradually started by the deferential wheel (I), which by the cogged sector (S′) moves the sliding rack (M), lifting its weight or spring, which operates the valve to admit less steam, if a throttle, or to cut off shorter if a cut-off, or to admit less water if a water wheel. And as the increased friction of the cone reduces the velocity of the shaft (F), the balls will be depressed by gravity, and the helical spring (D), to relieve the friction after the regulating motion has been induced.

It will be seen also, that the instant the speed of the motive power or pulley (L) is altered, a corresponding change of power is required to affect the shaft (F). Now, at a regular speed, the power required to drive the shaft (F) and move the governing rod being exactly balanced by the weight or spring (P), when the speed is altered, the rack (M) will move before the shaft (F) has begun to change its speed; and, if the increase or decrease of the speed of the motive power be very sudden, the rack can move to its full extent by one-half a revolution of the pulley.

When the governor is used on marine or portable engines, instead of the pendulum balls, a balanced bar, with a ball at each

end is used, and consequently but one cam instead of the two marked (áá). [*A bronze medal awarded.*

(MACHINERY No. 4.)

Steam Pumps, Gauges, &c.

Guild & Garrison's Direct and Double Acting Steam Pump and Fire Engine.

Guild, Garrison & Co., Williamsburgh, L. I.

These pumps are used for feeding boilers, for raising water, for clearing mines, and for drainage purposes, for supplying water to locomotives, for distilleries, sugar-houses, and manufactories, and, in fact, for every purpose and place where a first class steam pump is required, we warrant ours to be superior in every respect.

The advantages of an independent pump, driven by direct application of steam from the boilers, and having no connection with the engine, (in fact, being of itself an engine and pump com-

bined,) are so numerous, and will be so readily discerned by mechanics and engineers generally, that to specify them seems superfluous.

In feeding boilers, it enables the engineer to supply water while the engine is at rest, and the fires are kept burning, as at the noon recess, or any time during the day if it is required to stop an hour or two for repairs; in cases of steamers delayed in starting, or run aground, or ferry boats laying in the slip, or locomotives at railway stoppings, &c., &c. At such times, the surplus of steam, instead of wasting, is used to supply the boilers and prevent danger and accident from the water getting low; always affording an abundance of water, and that at the proper time.

As a fire pump, it is in readiness at all times of the day and night, by simply turning the steam-cock, to throw the water to any and all parts of the building; as a security against fire.

On rivers, lakes, and at sea, in cases of fire or accident, this pump is indispensably necessary. At such times, owing to the impossibility of escape, everything depends upon an efficient pump.

This pump is adapted to draining quarries, mines and excavations; also for raising water to a great height, as for reservoirs for supplying water to towns and cities.

It may also be used at pleasure in pumping hot or cold, fresh or salt water, acids, molasses, syrup, beer, and all classes of heavy and thick fluids. [*A silver medal awarded.*

Test of Steam Gauges.

From the importance of these instruments for safety in steamboilers, the American Institute resolved to institute examinations and trials, on which the public may rely, and made arrangements to test those which were on exhibition, under a mercury gauge. The Allen or volute gauge has a coiled flat spring encased in a tubular covering against which steam is passed, separated by a sheet of highly vulcanised rubber. The other two were of the elongated springs, in ordinary use.

Report of the Judges appointed to test the Steam Gauges.

The undersigned committee of investigation, submit this as the result of the mercurial test of steam gauges, made by us this the

26th day of January, 1858, at the Crystal Palace, under the auspices of the American Institute.

DAN'L R. BOWKER,
WM. BUCHANAN,
Committee.

Mercury.	Allen, (565.)	Allcroft.	Schmidt.	Mercury.	Allen, (1353.)
5	5	4½	2½	5	5
10	10	10	7½	7	7
15	15	14½	12½	10	10
20	20	20	17	12	12
25	25	25	22½	14	14
35	35	35	34	18	18
40	40	41	41	20	20
45	45	40	47	24	24¼
50	50	51	52½	34	34
55	55	57½	60	44	44½
60	60	62	66	48	48¼
65	66½	67	72	..	..
70	70½	72½	77½	..	..
75	75	78	84	..	..
80	80	84	88½	..	..
85	85	90	95	..	..
90	90	95	100	..	..
95	97	100	106	..	..
100	102	105½	111	..	..
105	..	111	117½	..	..
110	..	117	122	..	..
115	..	120	127½	..	..

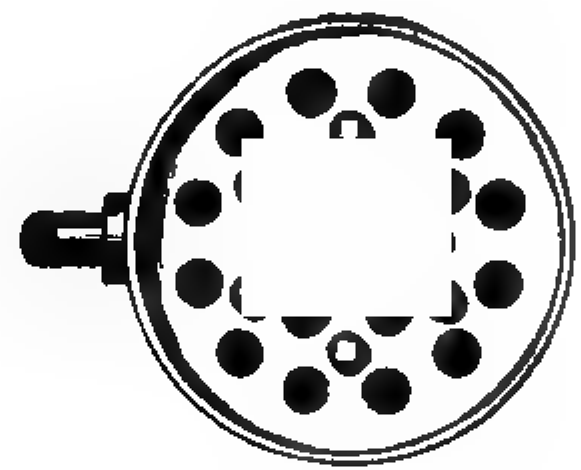
[*A silver medal having been before awarded. Diploma.*

Honey Comb Heater.

J. C. Hoadley, Lawrence, Mass.

For heating the feed water of steam engines, on its passage from the force pump to the boiler by the exhaust steam.

This heater received its name on account of its resemblance in form and appearance to the honey-comb. It is, in effect, a tubular heater, or boiler, constructed, in the language of the claim on which a patent was granted, "with the tubes, tube-sheets, or



HONEY COMB HEATER.

heads, and case, all of one piece of metal, without joints uniting them;" so that instead of the multitude of joints of the ordinary tubular heater, there are in this no joints save the six screw plugs in each section, which stop the holes when the cone was vented and removed, and the ground joint where the sections are united.

The surfaces being so subdivided as to be small in any one continuous direction, the metal is thin, and of uniform thickness throughout; and, being homogeneous, and homologous, is subject to no galvanic action, irregular contraction and expansion, or danger of leakage from any cause.

The surface of cast iron, especially when cast in cores, is rough, and by its points and projections presents a greater extent of surface in actual contact with both water and steam, than would wrought iron of equal nominal extent. A square foot, therefore, of cast iron, is more efficient than the same extent of wrought iron, or even of brass or copper.

It is unnecessary to say a word upon the value of the feed water heater. It is universally understood that a portion of the heat which is wasting from the exhaust pipe, may be utilized so as to raise the temperature of the feed water, from ordinary atmospheric temperature, say 40° to 70°, up to very near the boiling point.

The ordinary methods of accomplishing this important saving of about fifteen per cent, are expensive, and though many of them are efficient, they are, in general very troublesome on account of leakage. This heater aims at, and it is believed, attains to a maximum of effect and durability, at a minimum of cost and trouble.

The operation of this heater will be understood by a glance at the wood cuts: Fig. I, is an outside elevation; fig. II, is a vertical section through the axis; fig. III, is a top view of the lower half, with the upper half removed at the joint, at fig. I, showing the two rows of tubes, eighteen in all, viz: twelve in the outer row, and six in the inner one; the screw plugs, with square heads to turn them in by; the external flange, and central but, with its space around the bolt for the passage of the water from the lower to the upper section; fig. IV is a section through tubes and curves, on the line c d, fig. II.

It will be seen, fig. II, that one hub enters the other, conically, and it will be perceived that the only joint which is subject to pressure, is thus made in the most perfect manner, and most securely held by the central bolt. This point, as well as the outer one, is ground.

The ordinary mode of setting, is to let it form a joint of the upright exhaust pipe, so that the exhaust steam on leaving the engine, passes in at the lower nozzle, spreads out in the lower hemispherical cavity, passes on through the eighteen tubes of the lower section into the central cavity, thence through the eighteen tubes of the upper section into the upper cavity, and on through the nozzle into the exhaust pipe.

Or the direction of the steam may be reversed by taking it out of the exhaust pipe by a branch pipe, and in at the upper nozzle, draining out the water produced by condensation, at the bottom, the lower nozzle being closed, and furnished with a drain cock. This is sometimes the better plan.

The course of the water, entering at the lower opening, filling the space inside of the case, around and between the tubes, and between the heads; and passing through the hub, around the bolt, into the upper section, and out at the upper opening, is seen at a glance.

Nos. 1, 2 and 3, are made in a single section ; Nos. 4 to 8, in two sections; and beyond that, they may be combined at pleasure. They have been made in three and four sections, of the size of those in No. 8, making, respectively heaters 50 and 100 per cent larger than No. 8.

The power of engine for which the respective sizes are suitable, given in the second column, is calculated from a careful experiment of the quantity of water heated in a given time, from 50° up to 200°; assuming an evaporation of 8 lbs. of water per pound of coal, and 5 lbs. of coal per horse power per hour; or 40 lbs. of water per horse power per hour.

It is also assumed that the supply shall be regular. As the feeding cannot be, in practice, entirely regular, and is often very irregular, it is better to use a larger heater than is indicated in

the table: say No. 5, for 20 to 30 horse power; No. 8, for 30 to 40 horse power; double No. 8, for 50 to 60 horse power, &c.

The cores are well faced, and clean out perfectly, and the interior being well washed by allowing a stream of water to flow through it under a head, they have been found, on breaking them open for examination, quite free from sand.

The tubes being cast on end, there is no danger of blow holes or imperfect places, and being once tested with 200 lbs. per square inch in the water space, they must be as tight and durable as a cast iron kettle.

Cheap, light, portable, durable, efficient, easily set in operation, and requiring no care, unless it be to see that they do not freeze up when not in use; it is thought that they must commend themselves to universal favor, and find a purchaser in every owner of a steam engine.

The subjoined table gives in a succinct form, all important dimensions and facts:

No.	Power of engine for which heater is suitable.	No. of tubes.	Length of tubes.	Whole length.	Steam Way. Dia. of pipe equal to tubes.	Steam Way. Dia. of pipe at ends.	Steam Way. Dia. of flanges at ends	Capacity of water space in equivalent length of one inch pipe.	Heating surface.	Weight.	Price.
	H. P.		in.	in.	inch's.	inch's.	inch's.	Feet.	Sq. ft.	lbs.	
1	10	18	7	$19\frac{5}{8}$	$6\frac{3}{8}$	4	8	50	6.43	150	$14 00
2	20	18	10	22[illegible]	6[illegible]	4	8	74	8.71	178	18 00
3	30	18	13	25[illegible]	6[illegible]	4	8	98	11.00	205	22 00
4	35	18	14	$27\frac{1}{4}$	6[illegible]	4	8	100	12.86	243	24 00
5	40	18	17	$30\frac{1}{4}$	6[illegible]	5	9	124	15.09	271	28 00
6	50	18	20	$33\frac{1}{4}$	6[illegible]	5	9	148	17.37	300	32 00
7	60	18	23	$36\frac{1}{4}$	6[illegible]	6	10	172	19.65	328	36 00
8	70	18	26	$39\frac{1}{4}$	6[illegible]	6	10	196	21.93	356	40 00

This heater is composed of two symmetrical castings, and has only a single joint, which is so formed and constructed as to be free from all danger of leakage.

Every heater is tested with a pressure of 200 lbs. per square inch in the water space, and 40 lbs. in the steam space.

It is designed to heat the feed water of an engine by exhaust steam on the passage, from the force pump to the boiler. The

water space is therefore subjected to the pressure in the boiler, the steam space only to that in exhaust pipe.

It is compact, efficient, light, cheap and durable.

[*A bronze medal awarded.*

Process for Melting Iron Dust, Chips, Shavings, &c.

Abiel Pevey, Lowell, Mass.

Fig. 4.

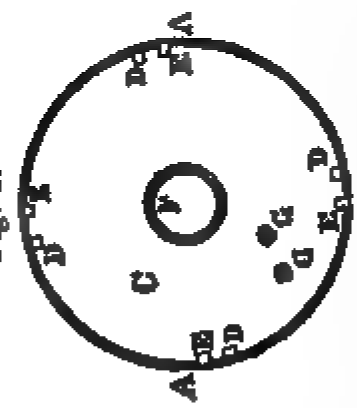


Fig. 3.

Fig. 2.

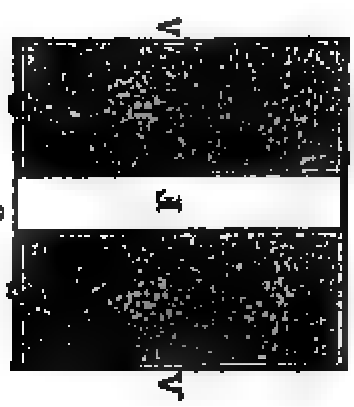


Fig. 1.

It is well known by mechanics, that turnings, cast-iron shavings, etc., are from the best stock, hence founders have attempted to re-convert them to available metal; but hitherto with only partial success. A deterioration in quality, and a great relative loss in quantity, have been sustained by every process heretofore employed. By this improved process, the original quality of the metal is unimpaired, the strength of castings augmented, loss is not greater than in the fusion of old machinery castings—about 10 per cent.

This new process consists in the use of cast iron pots, or vessels, in which the shavings and turnings are closely packed, and secured by a lid easily and safely adjusted. These vessels may be cylindrical, or otherwise formed, with one or more tubes extending through them, or without. But I have found the best results attending the use of vessels with one tube each.

These vessels being filled, are put into the vith other stock, pig, or old iron, and with the general contents ly descend. By the time each 'ill have melted, its contents will nuch affected by the heat, as to or cohere, and will not be in danger of dispersion from the force of the blast.

Fig. 1 is a perspective view of the vessel filled with cast iron chips. Fig. 2, a vertical section of the same. Fig. 3 is a vertical section of a retaining vessel, without a central perforation. Fig. 4

is a top view of figures 1 and 2. A A is the vessel; B the cast iron dust, chips, etc.; C the vessel cover; D the slots in the edge of the cover; E the projections which hold down the cover after passing through the slots D; F is the perforation through the central portion of the vessel; G G are the studs cast on the cover to turn it around so as to ketch under the projections E, to confine the turnings, dust, etc.

By this process the value of cast iron shavings, turnings, etc. compared with old machinery castings is 85 per cent. When iron is worth $1.00 per hundred pounds, shavings are worth 85 cents per hundred, or $17.00 per tun.

The cost of preparing vessels for cupola, including moulding, dressing and filling, each,	10	cents.
Waste on vessel, and general expenses, each,	5	"
Total,	15	"

From the contents of each vessel will be produced on an average nearly one hundred pounds of metal. [*A diploma awarded.*

Wilder's Sole Cutting Machine.

Eames and Hathaway, Milford, Mass.

The advantages of this machine are: 1st. Its simplicity of construction makes it less liable to get out of order, and is positive in its motion. 2d. It will cut any size, from men's down to the smallest size of youths', with two pair of knives. 3d. It can be altered to cut soles from right and left, in a quarter of a minute.

[*A silver medal awarded.*

Portable Steam Cross Cut Saws and Portable Farm Engines.

Forest Agricultural Steam Engine Co., Brooklyn, L. I.

A portable tubular steam boiler detached from the engine and mounted on a pair of iron cart wheels five feet in diameter, with

pole ready for draught by a yoke of oxen, and intended for use in the forest and on the farm.

Its peculiarities of excellence are as follows:

1. Compactness of form for convenience of moving about.
2. Large fire box for burning green or dry wood, or coal.
3. Large water way for safety in common workmen's hands.
4. Simple and safe mode of supplying water without a pump.
5. Practical portability, and easy and safe management in the hands of any intelligent woodsman or farmer.

A portable steam cross cut saw, detached from the boiler, and receiving its steam through a flexible hose of 100 or 200 feet in length.

Its peculiarities of excellence are as follows:

1. Extreme simplicity of construction and consequent ease of management by any intelligent woodsman or farmer.
2. Adequate strength, with light weight and easy portability.
3. Easy and quick attachment to the tree or log in any position.
4. Flexibility of the machine when at work, and tendency to work itself into line of action instead of out.
5. Thorough practical adaptation to its uses in sawing down, and sawing up trees into any desired length, when used in connection with the boiler above described, and the flexible hose to conduct the steam.

A portable farm engine detached from the boiler and mounted on a pair of small cart wheels, three feet in diameter, in a wood frame, receiving its steam through a flexible hose 100 or 200 feet in length and attached to the portable boiler, described above as article first of our exhibition.

Its peculiarities of excellence are as follows:

1. Simplicity of construction, and easy and safe management by any intelligent farmer.
2. Practical portability, and facility of application to various kinds of work, such as threshing and grinding grain, cleaning and ginning cotton, making shingles and staves in the woods, &c.
3. Safety from fire, the hose permitting the boiler to remain at a safe distance from the barn or other combustibles.

[*A gold medal awarded.*

(MACHINERY No. 5.)

HYDRAULICS.

West's Improved Pump.

Gay & West, 118 Maiden Lane, New-York.

It is commended for its extreme simplicity of construction, great strength and consequent durability, and cheapness of repair. Although it has but two valves necessary to its action, (an additional foot-valve being put in for greater security,) it is perfectly double-acting, throwing a continuous stream, with great force. There is no stuffing box in this pump—the pressure being held by a cup packing, like that upon the working piston, working in

West's Improved Pump.

a cylinder, fitted for the purpose, within the upper air chamber; which, we think, must be a great improvement, as stuffing is so liable to be deranged and to leak under a strong pressure, to say nothing of the great loss by friction incident thereto. It has also two air-chambers—the one as before mentioned surrounding the upper cylinder and communicating with the pump above the valves, the other surrounding the lower or working cylinder, and communicating below the valves; thus the action of the valves is cushioned upon both sides by air—preventing water-hammer and vacuum thump, and enabling a much smaller and less expensive pipe to supply the pump. The valves are very accessible, and simply and cheaply repaired. [*A bronze medal awarded.*

Tower's Patent Elastic Ball Valve Pump and Fire Engine.

Webster & Tower, 124 Broadway, New-York.

The great object of the inventor in this improvement has been to construct a pump, which, while it serves all the purposes of the ordinary lift and force pump, may also be used at any moment as an effective Fire Engine: as such, it requires to be substantially made, and to be free from liability to disorder, whether by choking or the wearing of the parts.

This pump is furnished with ball valves, I I—double ball valves would be a more suitable term, which is composed of india rubber, or other suitable elastic substance. In consequence of their elasticity, the balls always fit their seats closely, while the rush of the water causes the valves partially to revolve at every stroke, so that the surface contact of the valves, with their seats, is continually changing. Hence the wear oi the valves is even and very slight.

The raised seats and elasticity of the valves are safeguards against the choking of the pump. The valves being free from hinges and other appurtenances, it is plain that foreign substances can find no lodgment; even if they did, it would matter little, since the valves are self-adjusting, and their elasticity would permit their accommodation to the seats, and to any foreign matter that happened to be left upon them.

The plungers, C, are hollow; the stuffing-boxes, J, and the screws are made of brass or composition, by which mode of con-

struction the working parts are more durable and less liable to injury from oxidation from sea-water. The connecting rods, D, are attached to the bottom of the plungers, by which means great steadiness of motion and directness of action is secured, and much power saved in working.

Instead of packing the piston head in the common manner, the vacuum is produced by causing the plungers—which are almost of the same size as the pump-barrels, A—to pass through stuffing boxes, J. If, from long use or unusual pressure, (as in the case of fire) the packing in the stuffing boxes becomes loose, it is quickly tightened without removing the plungers, by turning the stuffing screws. This is regarded as a very desirable advantage over ordinary pumps, as it will be unnecessary, in any case, to take the pump apart for this purpose.

In the operation of this invention the water enters the supply pipe, E, chamber, F, and passes through raised valve seats, H, and air chamber pipes, G, alternately, into air chamber, B, whence it is discharged by hose pipe in the usual manner.

As a ship's bilge or head pump, this improvement is of great utility, since grain and other articles may be carried in bulk, without any danger of choking the valves; the same pump is also available in case of fire.

Placed upon a small platform with wheels, the pump is adapted as a fire engine for steamboats, villages, &c., the cost being very small.

An attachment can be placed on the brake, so that power can be applied if required, or the pump can be worked by hand.

The ends of the brake bar are furnished with cavities, into which the break levers, K, (which are furnished with the pump,) are introduced.

In consequence of the certainty of action and tightness of the valves this pump is unequalled for pumping air for submarine or other purposes.

For mining, plantation, and all other hydraulic uses, it is confidently asserted, that this pump has no superior for economy, efficiency, and durability, and successful use.

[*A large silver medal awarded.*

Andrew's Patent Anti-Friction Centrifugal Pump.

W. D. Andrews, 414 Water street, New-York.

Fig. 1, is a perspective view of the pump in position for use.

Fig. 2, a vertical section.

Fig. 3, the rotating disc and propelling wings.

Fig. 4, the stationary hub and induction passages.

Similar letters refer to like parts.

The arrows show the direction in which the disc rotates.

A, is the base of the pump, by which it is secured in position. C, is the chamber, cast in one piece, with base A, and strengthened by brackets a, a, a, a. The chamber is connected by flanges b, b, to the conducting case, composed of two parts D, D′, joined by flanches d, d′, forming a spiral eduction passage E, commencing a, b, c, and gradually enlarging to the discharge orifice e′.

F, is a stuffing box, through which passes the driving shaft G, supported in a long bearing on standard H, which is bolted to bosses I, I′, upon the spiral passage E.

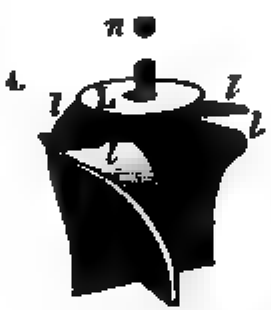
K, fig. 2, is the disc, secured upon shaft G, to which its periphery forms an angle of forty-five degrees. Upon its periphery are secured wings, 1, 2, 3, 4, 5, 6; fig. 3, closely fitting the space between it and chamber C, within which they revolve without touching. The upper ends of the wings extend above disc K, in close proximity to case D′, but not touching it, and terminate on a line parallel to shaft G. L, is the hub, secured in the lower part of case C, by stationary curved wings l, l, l, l, which form spiral induction passages. N, is a hardened steel step, secured in hub L. A recess in the end of shaft G, receives a hardened steel button n, the convex surface of which rests and revolves upon the convex end of step D, supporting disc K, its shaft, &c.

O, is a belt, upon pulley P, communicating through shaft G to the disc and wings. Upon the end of passage E is a flanch, to which pipes are attached for forcing the water wherever required. The suction pipe B, fig. 2, is bolted to base A, and has a valve at its lower end, not shown.

Operation.—The suction pipe and pump being first filled with water, rapid motion is given to disc K, when the centrifugal force communicated to the water between its wings, carries it up the

Fig. 3.

Fig. 4.



ANDREW'S PATENT ANTI-FRICTION CENTRIFU

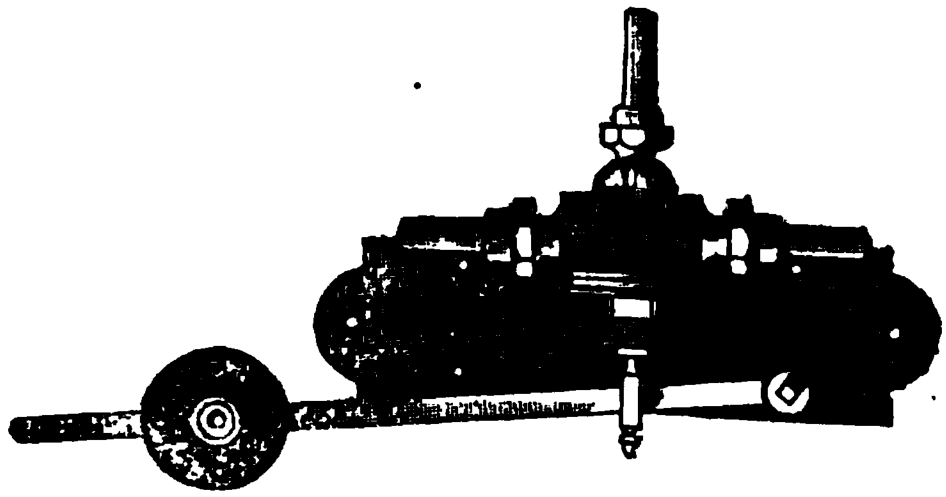
inclined plane in case D, to passage E, and thence to the point of delivery, a vacuum being thereby created between the wings, causes the water to rise through pipe B, to keep up the supply. By means of the spiral passages formed by hub L and its wings, the water from pipe B is gradually turned from a vertical to a nearly horizontal course, and delivered to the propelling wings in the line of their action, thence through the spiral passage E, it is again, by an easy, gradual curve, brought back to a straight course upon reaching the outlet e. The wings upon disc K passing above its upper edge, create and maintain a vacuum between it and case D, and prevent sand, dirt, &c., from coming in contact with the shaft. Step N is in like manner protected from dirt, enabling the pump constantly to discharge a large proportion of sand, gravel, &c., without injury to any of its parts.

There being no valves in action, (the foot valve remaining open while the pump is in motion, and used only to retain the charge while the pump is at rest,) and no wearing parts, except the shaft in its bearings, the friction is reduced to the smallest possible fraction, enabling a pump to run for years without repairs. A large percentage of power lost in piston pumps in overcoming the momentum and inertia at each stroke is saved by this pump; also the power lost in other centrifugal pumps in moving the water at right angles, as by this construction all changes of direction are made by easy curves, enabling the pump to do the same work at a much lower velocity, and consequent expenditure of power. It works equally well as a suction or force pump.

[*A large silver medal awarded.*

Carr's New Cut-off for Kitchen Boilers.

Sawyer & Carr, 3 Bedford street, New-York.



The object of this invention is to prevent water in tanks or reservoirs, (located in attic stories for supplying upper parts of houses,) from being drawn off for

kitchen purposes. It occupies very small space, and can be attached to any boiler now in use, at small expense.

[*A silver medal awarded.*

Carr's Self-acting Pan Water Closet.

Sawyer & Carr, 3 Bedford street, New-York.

The weight of a person on the seat of the closet, depresses the rod C, when the valve B descends and the plug F takes its place. This movement of the valve causes a momentary dash of water to pass into and around the closet basin O, thereby preventing the adherence of soil, etc., but the instant the plug F, enters the part previously occupied by the valve B, it immediately prevents any more water running while the closet is being used. On the person's weight being removed from the seat, the stem H of the cock rises, thereby lifting the plug F from its seat. The water now commences to flow into the closet basin, and the projection of the rod C catching under the latch M, lifts off the brass lever R from the iron weight P, which allows the pan to unlock and drop to its full extent, emptying its contents. In order to have the pan thoroughly washed out and cleansed, it is retained in this open position by the crook at the end of the brass lever R, dropping into the notch S of the weight P, and holding it there until the rod C in gradually rising, lifts up the crook, when the weight P, (being now the heaviest, as the pan is empty,) drops and closes up the pan,—but the valve B is not yet up to its place, as it is regulated to run sufficiently after the closing of the pan, to leave the latter full of clean water, when it is again ready for use.

[*A silver medal awarded.*

Hanson's Self-Acting Water Pump and Meter.

Thomas Hanson, 137 Third avenue, New-York.

This engine is designed to elevate water to a greater level than it would naturally rise to; and operates by surplus pressure in the pipes, not heretofore used.

In cities supplied with water from an elevated reservoir, like the Croton or Schuylkill water works, the water when drawn from the pipes, rushes out with great violence, instantly filling small vessels, often wasting much water by unavoidable overflow, and not unfrequently drenching the clothes of the unwary; when suddenly stopped, the rebound tends to burst the pipes, and is often the cause of injury and loss.

The Self-acting Pump makes profitable use of all this wild pressure in the pipes, and converts its mischievous tendency into a most useful occupation, that of pumping up, to a cistern in the upper story of a house, the water which would not rise there of itself. This is accomplished without loss to any one, and with positive gain to all interested, both in the water and in the pipes which convey it. In such cases the machine is attached to the service pipe in the lower part of the house, between the street main and the lowest point where the water is drawn. All the water used in the house passes through it, works its pistons, and is measured by a simple register of its strokes, each of which represents a given and uniform quantity. It requires no attendance, is almost silent in operation; moves when water is drawn, and is at rest as soon as the water is stopped.

It may be worked by the refuse water from the upper stories of hotels, where much is used, and will pump up at least seventy-five

per cent. of fresh water to the elevation from which the refuse water is supplied.

This machine is particularly useful in country places, where there is a limited supply of water. It can be so arranged, that when the house cistern is full, the machine will stop, and allow the spring or reservoir to accumulate its greatest supply. When water is then drawn from the cistern, the pump will commence working, and will continue until the cistern is again full. In this respect it differs from the hydraulic ram, which, when in order, will run constantly, overflowing the cistern and wasting the water of the fountain.

It is also more useful in tide-water than the ram. It is well known that when a ram is overpowered by the rise of the tide, the water of the spring silently passes through it without effect. This machine, placed in a similar position, will not allow any water to escape, although overpowered, but will cease working until the tide recedes sufficiently to allow it to work to advantage. It will also work with turbid water, and pump up spring water.

[*A silver medal awarded.*

Hanson's Hydraulic Rams.

Thomas Hanson, 137 Third avenue, New-York.

This invention consists in combining with the cylinder or driving chamber of a water ram and the air vessel thereof, a cylin-

drical tube, or an equivalent thereto; the bore of which, for the passage of water, is provided with a cup of leather or other equivalent substance, secured and held at or about the centre of the said tube, so that when spread out by the preponderance of the pressure in the air vessel above it, shall be brought in contact all around with the bore of the tube, and thus close the passage to the driving chamber; and when contracted by the preponderance of the pressure in the driving chamber, it shall open the said tube for the direct passage of water from the driving chamber to the air vessel.

There is now applied a new mode of regulating the outer valve, in place of nuts and screws, which are liable to unscrew by the jarring movement of the ram, and has ever been a source of annoyance, by means of a lever and screw, as is shown in the vertical sectional view.

The annexed statistical table of facts, is derived from the operation of my number two sized ram, now at the subscriber's place of business, and visible every day; the said apparatus is supplied by a one inch drive pipe, thirteen feet long, arranged for all the different elevations stated. The various sizes perform the same proportionate functions. Each larger size will raise more than double the quantity of water in a given time.

Fall or head of water.	At an elevation of	Amount of water rais'd per hour.	What proportion raised.	Fall or head of water.	At an elevation of	Amount of water rais'd per hour.	What proportion raised.
8 feet.	20 ft.	84 galls.	1–3	5 feet.	20 ft.	34 galls.	1–6
" "	40 "	45 "	1–7	" "	40 "	20 "	1–11
" "	60 "	30 "	1–10	" "	60 "	15 "	1–17
" "	80 "	25 "	1–14	" "	80 "	11 "	1–23
" "	100 "	20 "	1–18	" "	100 "	8 "	1–29
7 "	20 "	64 "	1–4	4 "	20 "	23 "	1–7
" "	40 "	34 "	1–8	" "	40 "	15 "	1–16
" "	60 "	25 "	1–12	" "	60 "	10 "	1–22
" "	80 "	20 "	1–16	" "	80 "	7 "	1–30
" "	100 "	16 "	1–20	3 "	20 "	15 "	1–10
6 "	20 "	45 "	1–5	" "	40 "	9 "	1–20
" "	40 "	27 "	1–9	" "	60 "	6½ "	1–30
" "	60 "	19 "	1–14	2 "	20 "	7½ "	1–14
" "	80 "	15 "	1–20	" "	40 "	4¾ "	1–30
" "	100 "	12 "	1–25				

Bartholomew's Pan and Hopper Closet Valve.

F. H. Bartholomew, 84 Marion street, New-York.

The drawing, figure one, represents an improvement in the ordinary Pan Water Closet, the purpose of which is to save the expense and room required for cistern, service box, ball cock, overflow pipe, crank-wires, or air vessel, so that the whole fixture shall be arranged beneath the seat-board, out of sight; while the valve shall be placed upon the top of the trunk of the closet, enclosed in a safe, or drip-box, so that all the waste from the pipe, between the valve and the basin, and any leakage that may possibly take place about the valve or the couplings, shall go directly into the closet, and cannot therefore wet the floor, however much the valve shall leak. E is the safe, or drip-box, which

Fig. 1.

Fig. 2. Vertical section of the above.

Bartholomew's Pan and Hopper Closet Valve.

is formed by casting a flange or rim upon the plate of the closet, within which is an opening of about one inch, which is tapped, and into which the valve cock, A, is firmly screwed: beneath the plate is arranged a lever which is suspended by the screw D, (the screw passing through the lever into a brass nut.) The journal upon which the pan is hung is provided with a cam, cast upon it near the front bearing, and upon lifting the handle of the closet, the cam forces down one end of the lever, lifting the opposite end about one-half inch. The stem or spindle of the valve projects down through the bottom of the cock, below the plate of the closet, and rests upon the lever, and is lifted when the pan is discharged. The screw D, upon which the lever hangs, is used to regulate the lifting of the valve, and thus, by turning the screw to the right or left, the valve is made to discharge more or less water into the pan after the handle is dropped. The construction of the valve is such that it will properly fill the pan after it is discharged and in place, however rapidly the pan is opened and shut. This screw will admit of being turned so far to the left as to let the lever drop so low, that in case the pipes and valve should freeze, the closet can be used without lifting the valve open. The water is conducted from the main pipe, or from a tank upon the house, directly through the valve, in the direction indicated by the arrow on the body of the cock, to the basin. No intermediate receiver, or waste pipe, or air vessel being required, and no jarring of the pipe is produced, the pipe C wasting directly into the closet. The valve is arranged so that but little pipe is required to connect it with the main or the basin. The working parts of this valve can all be taken out by simply unscrewing the screw cap, and without disturbing the body of the valve, or either of the couplings. The valve being in reversed position, the leather facing shutting downward is likely to prevent any obstruction by lead chips, dirt, &c.

The peculiar construction of this valve is such, that however rapidly it may be opened, it always suspends itself open a sufficient length of time to admit an "after-supply" of water into the pan to fill it properly—and gives a continuous supply while the handle of the closet is lifted.

This valve, of a different form and modification, is adapted to the purpose of hopper closets, being operated by pressure upon

the seat-board, giving a supply of water into the hopper only after the pressure upon the seat has been removed, using water economically, requiring no air vessel, nor jarring the pipe—the whole arranged beneath the seat.

Figure 2 is a drawing of an improved Hopper closet, with the Bartholomew Patent-Self-Acting Valve attached. This hopper of the most approved form in use—cast iron, either enamelled or plain—having a broad flange, firmly braced, cast upon it, by which the hopper is substantially secured to and supported entirely by the floor, without requiring any riser or wood work about it to support it. A projection is cast upon the rear upper end of the hopper, to which a board of six inches width is screwed, and to this board the seat-board is hinged, having a weight attached so as to keep the seat-board in an upright position when not in use, as shown in drawing, by which the hopper may be used for a urinal or slop sink, and yet the seat-board always kept dry and clean. The valve is held open when the seat-board is held down, and closes upon the rising of the seat. It will be seen that no carpenter work or wood is required about this hopper, except the seat-board and floor as shown—thus giving facilities for keeping the premises clean and pure—avoiding the nuisance of confined foul air and filth which attend the fixture when closely shut up. This improvement is well adapted to hotels, schools, hospitals, and other public, as well as private buildings.

[*A bronze medal awarded.*

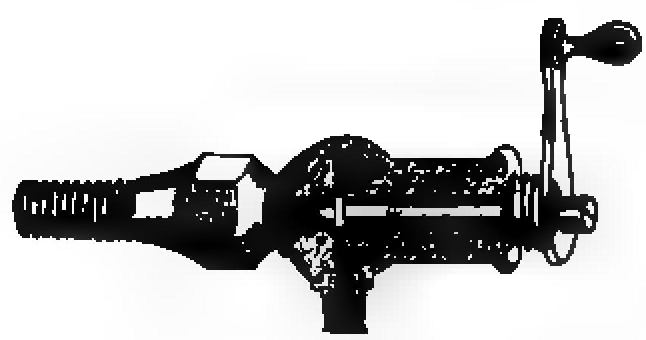
Bartholomew's Self-Acting Safety Valve Bibb Cock.

J. H. Bartholomew, No. 84 Marion street, New-York.

This valve has a leather or rubber face "E," shuts upward against the flow of water, by the action of a spring "D;" has a diaphragm of rubber over the top, preventing any leakage about the stem. Cap "B" confines the upright lever "A," and diaphragm in place. By inclining the lever "A" in any direction the valve is depressed

and opened; cannot be fastened opened easily. By unscrewing "F" the valve, spring and washer all come out. All the working parts can be taken out for repair, and be replaced without detaching the cock from the pipe. Not injured by freezing.

[*A diploma awarded.*



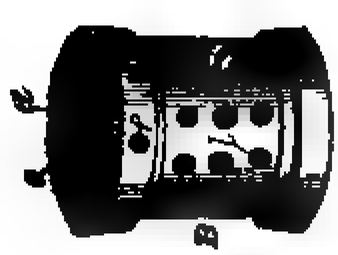
McNab, Carr & Co's Valves, Couplings and Cocks.

McNab, Carr & Co., 95 and 133 Mercer street, New-York.

[*A silver medal awarded.*

Ayers' Cylindrical Filter.

W. W. Ayres, Worcester, Mass.



The invention consists in the combined construction and arrangement of the stop-cock or faucet by which the water is drawn, and the water channels in the filter, by which the water may be allowed to flow inwardly or outwardly, through the cylindrical filter or shut off entirely from passing in either direction, as the case may require.

Figure 1, shows the filter slightly in perspective, the lower parts of it being most distinctly represented.

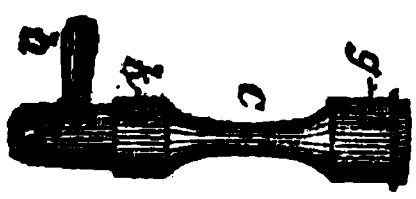


Figure 2, is a perspective view of the internal cylinder, on which the felt cloth or other filtering fabric is wound, and secured by brass wires, wound around at the top and bottom, and at intervals between.

Figure 3, is a side view of the stop-cock, through which the water may be drawn, and by means of which its direction through the felt may be changed. This filter is intended to be attached at its upper end to the pipe through which the water is received. The water enters a central opening in the top of the stop-cock C. This stop-cock or faucet is fitted into the hub, in the middle of the hollow arms d, which cross the cylinder B at its top and bottom. These arms, d, have holes, e and f, which extend outward, the hole f extending through the rim of the filtering cylinder, so as to deliver the water outside of the felt cloth, and the hole e terminating inside of the filtering cloth. The hollow bar which crosses the bottom of the filtering cylinder B, is similar to the bar d at the top, except that the relative positions and directions of the holes e and f are reversed. These holes in the upper bar receive the water from the hole g, in the upper part of the stop-cock, and the holes in the lower bar return it into the stop-cock, through the hole k, after it has passed through the felt, when the stop-cock is turned into a position to allow the water to pass in either direction. As before stated, the holes e and f, in the lower bar, are in reverse position to those in the upper bar, and thus while that in the upper bar, which discharges outside of the cylinder B, receives water from the opening g, and so discharges it, the same water is received (after being filtered through the felt) into that opening in the lower bar which terminates inside of the cylinder, and passes through it and the opening k, into the lower end of the stop-cock C, from which it is discharged, through a central opening at the bottom. If the position of the stop-cock C is reversed (which may be done by means of the handle b) so as to bring the hole g to correspond with the hole e, in the upper bar, the current is reversed, and by this means the filter is readily cleansed of ordinary impurities, without taking it apart, by simply turning the stop-cock in the opposite direction from that in which

Fig. 1 Fig. 2

COCHRANE'S WATER METRE.

it is turned to draw water for use, an operation easily comprehended and performed by almost any "drawer of water." h, h, are stops on the bottom of the filter, to restrict the motion of the handle b. The flow of water through the filter in either direction is stopped, by turning the handle b into the intermediate position between the stops h, h. There are small holes, l, in the cylinder, B, to allow the water to pass, either before or after it has passed the felt.

The arrangement here described gives a large filtering surface within a very limited diameter, and by means of this device for reversing the current, it is easily kept in order.

[*A bronze medal awarded.*

Cochrane's Water Metre.

James Cochrane, No. 8 Tenth street, near Sixth avenue, New-York.

Liberal supplies of water in cities, are blessings which can not be too highly appreciated. To prevent waste, however, the necessity of some method of recording the quantity used in each household or establishment, is very much felt, and various methods have been adopted for effecting this result. None, however, measure with absolute mathematical perfection; some are quite expensive, and nearly all have stuffing boxes, packing, or the like, rendering them more or less liable to get out of order.

The meter represented in the accompanying engravings, an apparatus recently invented by James Cochrane, of this city, is so arranged as to require no packed part, to work practically independent of friction, and to afford a means of measuring with

great accuracy whether the flow be rapid or extremely slow. It has been constructed in various sizes, and is already in successful use in several portions of this city.

The water is received in a rocking cup, divided in two compartments. When tilted to one side, the partition induces the water to accumulate in the upper side until its gravity is sufficient to tilt the cup and discharge the quantity thus measured and weighed, and induce its accumulation on the opposite side. So far, this is an old device, but to allow the apparatus to work under a head and without diminishing the pressure of the water, the case or vessel in which the whole is enclosed, is partially filled with compressed air; and to prevent the loss of this compressed air by its escape through the pores of the metal, or its absorption by the water, provision is made for discharging, at each movement of the rocking cup, a small quantity of water from the lower part of the case, and for receiving in its place an equal volume of air from the outside, which is allowed to rise through the water, as represented.

Fig. 1, is a perspective view of the whole, the upper portion being of glass, to allow a view of the interior; while fig. 2 and 3 represent sections, on a larger scale, of the device for supplying air. Fig. 4, is a vertical section of the whole, as ordinarily constructed of cast-iron.

A is the pipe which supplies the water, and B a receiving and retarding vessel, bolted upon the top of the main case, C. This vessel serves as a kind of air chamber, and allows the water to fall gently into the cup below. D is a cock, through which the water is discharged, and E E is the surface of the water within; it being understood that the air above E is at the density required to equal the pressure due to the head of water. This density is acquired, in the first instance, simply by the rise of the surface E E, which thus compresses it. F is the rocking cup, and F the partition therein. The cup being supported on suitable bearings, its pivot is free to roll horizontally, to a slight extent, and thus to make the resistance a rolling rather than a sliding friction. G is a lever, mounted in the same frame with F, and immediately below it. It is slightly bent, as described, and immediately below

it is a cross-bar, H, which regulates the extent to which either end of the lever G may be depressed. The centre of gravity of the rocking cup F, is at the point indicated by the star, in fig. 4, and its motion with the vibration of F, is a curve, as represented by the short dotted line. The centre of gravity is thus lower at either extremity of its motion than at the middle of its vibration; and, in short, by well known laws, the cup inclines with a certain uniform degree of force, to remain at either extreme of its motion. The water received from B through the tube represented, accumulates on one side of F′, until its gravity is sufficient to overcome this tendency, when the cup rapidly tilts, and discharging its load on that side, commences to receive an equal amount on the other. There is no resistance to the commencement of this rocking motion, except the gravity of the cup F and the rolling friction of the support; but towards the close of its motion, it strikes the elevated end of the lever G, and depresses it. The devices for recording the strokes, and also, for receiving the air, are worked from this lever, G, by the aid of the rod I; and both these operations, though necessarily communicating with the exterior of the case, are performed without the aid of a stuffing box of any kind.

The tight joint required at the point where the motion is carried out through the case, is obtained by the use of a kind of minature slide valve, held to its seat by the pressure of the fluid within. A hollow projection, K, extends upward from the bottom into the interior of the case, A. Its interior communicates freely with the atmosphere, and its exterior is plane on one side and perforated, as represented in fig. 2, the perforations being covered by the small slide valve J. This slide valve is connected by the rod I, to the lever G, and consequently moves vertically on the plane surface of K, at each movement of the latter.

The indicating mechanism is on the exterior of the case. It is similar to that ordinarily employed on gas meters and the like, and carries several indexes, which work on the face of corresponding dials, as represented by R, in fig. 1. A rachet wheel on the lowest and quickest shaft is operated by a pawl, which latter is connected to the work inside through the rod L, which stands loosely enclosed in the interior of K, and is connected firmly to

the slide valve J, at the point K′, fig. 2. This connection avoids the necessity for a stuffing box.

When the valve J, is in its lowest position, the water in its interior escapes through the aperture K‴, and air from the interior of K flows in through the aperture J, to supply its place. Now when, by the means described, the valve J, is raised to its highest position (that represented in the figures) the air freely escapes from the interior of J through the cavity J′, and water finds access through side openings, imperfectly represented by dots, so as to flow in through J″. At each movement of G, therefore, the indicating apparatus, R, shows that water has been discharged from the cup, F, and also allows a quantity of air to rise in bubbles through the water, as shown in fig. 4.

The various pipes and cocks connected to the base of the case, C, serve to draw water therefrom in the usual manner. They may discharge it directly at the cock from which it is seen flowing, or may lead it in the pipe represented to any distance, and the whole apparatus serves as an air chamber to regulate the motion of the water.

The device for receiving air is made a little larger than necessary, in order to ensure a sufficient supply of that fluid within the case. Under ordinary circumstances, no harm can arise from a too great accumulation of air, as the aperture K″ which obstructs the water, being higher than either of the other outlets, it simply follows that if the water surface becomes too low, small quantities of air instead of water are discharged through the cavity of the slide valve, J, and as the density of the air escaping is greater than that introduced, the effect of this device is to reduce rather than increase the quantum of air in the case, C; thus there is no possibility of too much air accumulating, except under unusual circumstances. In case the pressure in the street main should be suddenly diminished, in consequence of the bursting of a pipe, or of an extraordinary quantity being drawn out in case of a fire in the vicinity, the air enclosed in C, by expanding, might force its way backward into the main. To avoid this, the reservoir, B, is arranged, as represented, so that it will receive and contain any air which might thus be displaced, and hold it ready for discharge into the case C again, so soon as the pressure is restored. The

inventor is ready to guarantee that these meters will operate perfectly without any attention for seven years, and it is presumed that they will endure for a much longer period without any derangement.

Novel points claimed for Cochrane's Patent Water Meter:

It improves the quality of the water by supplying and reviving it with an extra quantity of air, (it is a well established fact that water loses a portion of the air it contained previous to entering the pipes by the levity of the air lodging it in any elevated portions of the main pipes, when it is disengaged from the water, which is the case when traversing pipes under pressure.) It has the beneficial effect of having a large constantly supplied air vessel, which wholly prevents concussion in the delivery pipes, thus permitting lighter plumbing. It is constantly when in action, condensing or compressing small quantities of air, which measurably prevents freezing by increasing the temperature—thus it is less liable to freeze.

It is not liable to be injured by frost, as the ice would be accommodated with expansive room, and thus not fracture or injure the meter.

It requires no stuffing box.

It will discharge the measured water under the identical pressure of the source of supply. It measures a constant stream as accurately as any other meter possibly can, and must (from principle,) measure the smaller quantities when any other will fail to do so from wear.

It can be manufactured at considerable less cost than any other device for the same purpose, known at this time. The most costly parts are as cheap and durable as the main pipes, and its wearing parts can all be replaced (in a common sized house meter,) for two dollars.

It can with perfect safety be warranted in ordinary cases at least fifteen years, without repair. [*A diploma awarded.*

(MACHINERY No. 6.)

PRINTING PRESSES.

Newbury's Reciprocating Cylinder Printing Press.

A. & B. Newbury, Windham Centre, New-York.

The peculiar feature of the press, are a stationary bed, in connection with an impression cylinder rotating and reciprocating

Cylinder Printing Press.

within endless racks, together with the arrangement of the flying apparatus. To enable you to form an idea of its arrangement and operation, we will give as clear and explicit a description of its various parts, and their movements, as possible. In the first place the bed is the foundation of the press, and the body of the framework; on each corner of the bed are secured with great firmness, four legs, shaped to suit the various purposes of stands, &c., for the driv'g machinery; lugs or ears are cast on the legs near the bed, for the purpose of sustaining the endless racks. The racks are so fitted to the lugs that by means of set screws they are raised or lowered to set the impression. The endless racks have their teeth on their inner surface. In form they are straight as far as it is necessary to reciprocate; the ends are exact half circles; the outside form of a condensed letter O, would give a fair illustration of their shape; in the centre and back of the racks is a slide exactly equi-distant from the internal surface of the racks. The impression cylinder has on each end of its shaft pinions, whose pitch line are the size of the cylinder. These pinions run in the two endless racks; the shafts of the cylinders extend beyond the pinions far enough to form a journal; these journals revolve in boxes, one side of which acts as a slide, and are adjustable, so as to regulate the mash of cylinder pinions and endless racks; in their operation they reciprocate and revolve around the centre slide of endless racks, thus keeping the cylinder pinions always in gear. The cylinder is driven

by cranks at the end of the frame, connected by connecting bars attached to the cylinder shaft. When set in motion it operates as follows: Passing along on the top of the centre slide it gripes the sheet at the centre of reciprocation, then continuing on to the end of centre slide, it is let down on the under side, by means of lifting bars, governed by a cam; passing over the type it is thrown up at the opposite end by the same means. The lifting bars operate as bearers, when down, to sustain the cylinder from uneven pressure. The inking apparatus is similar to that of the Adams press; the composition rollers, however, run on adjustable bearers. The flying apparatus is of the most simple construction, being a light frame attached each side of cylinder on cylinder shaft, and having wheels on the other end, fitted to run or reciprocate on a track parallel with the bed. The end of fly frame attached to the cylinder has tape rollers on, similar to any cylinder press, for taking off the sheet; from these rollers tapes are carried around two small rollers at the other end of frame. Its operation is this: the sheet is delivered on the tapes, and as the cylinder reciprocates back it is carried so as to just project from between the small rollers at the end of the fly frame; in the next reciprocation forward the sheet is delivered from between the rollers as fast as it reciprocates, and is thus spread out on the fly table. The fly table is so arranged that at every impression it settles the thickness of one sheet until it contains one thousand sheets. It delivers with great perfection and will deliver two sheets at once as well as one—that is two small forms may be put on the press at the same time, one say six inches square, and the other one foot by two feet, and the paper fed on each side of the feed board, it will deliver both with the same facility and perfection it does one.

These presses are worked either by hand or power, and require no further alteration than simply taking off or putting on the hand crank. They work with great rapidity, give a clear and beautiful impression and require but little power to drive them. A boy eighteen years old will drive a double medium press all day, at eight hundred or one thousand impressions per hour; they are easily adjusted, and are not liable to get out of repair.

[*A silver medal awarded.*

MACHINERY No. 7.

GRIST AND SAW MILLS.

Harrison's Flour and Grain Mills.

Edward Harrison, New Haven, Conn.

These mills are constructed wholly of stone and metal, in a strong and compact manner. The frames are made of cast-iron throughout, including the hopper, which admits of their being continually used with a strong power without yielding.

The cut is a representation of a geared mill. The gear wheels are made of iron, and run as well as it is possible to make them. The belt runs on a pulley, upon a horizontal shaft, which, by bevil gear, gives motion to the spindle.

The gears should be kept well greased, or, by constant friction, they will rapidly wear away and need the substitution of new ones.

It is much easier to attach the power to these mills from common horse powers or horizontal shafting; and they are provided with gears for that purpose. Pulley mills (as exemplified in the

above cut) run with the least noise, will last longer, and are recommended in all cases where they can be conveniently used.

The twenty inch is a superior farm and plantation mill, grinding corn and all kinds of grain in the best manner, by horse power. The demand for a mill which can be made to grind wheat, corn, &c., by horse power, for farm or plantation use, has not heretofore been supplied; and public attention is invited to this small mill.

The thirty inch mills are now used in place of common stone, in many of the best mills in the country, with decided advantage, both in the power required and in the quality and quantity of the meal.

If at any time the mill does not grind as fine as you require without the stones hitting each other, then let the faces be ground together for a short time lightly, dress off the glazed surface, being careful not to touch the faces where they are not smooth by grinding. Repeat this process a few times, if necessary, and you have a perfectly faced mill.

Never use a straight-edge or red stick on my mills, or you will certainly get the stones out of face, and there is but one exception to this rule, viz: When either of the stones become very much rounding, then true them again by a straight-edge, and afterwards bring them to a good face by grinding and picking, as described before.

My mills will not shake if run on an inch floor, when the runner is well balanced; and if they ever do shake, even at any speed, stop the mill at once, and balance the runner, by taking two metal straight-edges and placing them level upon solid benches, high enough from the floor so that the stone will turn. Then let the stone be placed upon the level straight-edges, so as to turn freely upon the bearings of the spindle, and balance the stone by adding weight to the light side, so that it will remain still when turned to any position. [*A gold medal having been before awarded, Dip.*

MACHINERY No. 8.

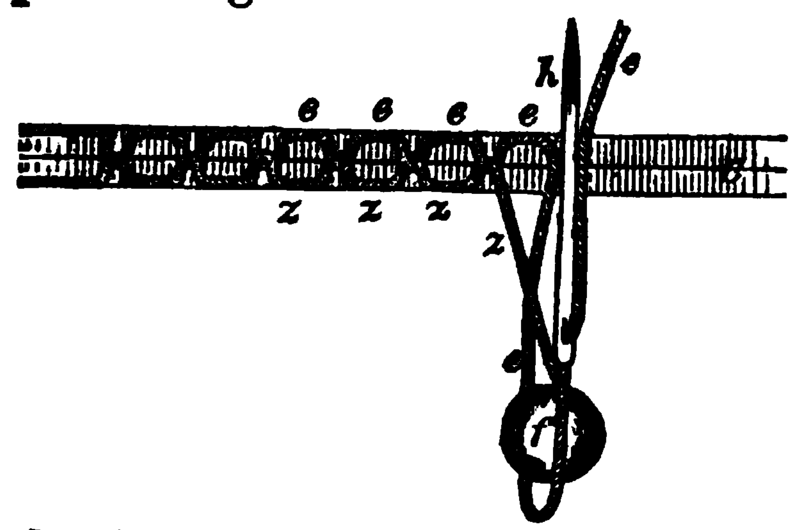
SEWING MACHINES.

Wheeler & Wilson's Sewing Machine.

Wheeler & Wilson Manufacturing Co., 343 Broadway, New-York.

The excellence and superiority of this machine consists, in the firm and durable seam which it forms, of equal beauty upon each side of the fabric sewed, and made with economy of thread; in the simplicity and thoroughness of its construction; the elegance of its model and finish; the facility of its management; the ease, rapidity and quietness of its operation; and its applicability to a variety of purposes and materials.

The stitch made by this machine is illustrated by the diagram, representing a section of fabric sewed with it. It is formed with two



threads, e and z, one being above the fabric and the other below it, and interlocked at each stitch in the centre of it. The same thread does not appear alternately above and below the fabric at each stitch, but that above the fabric is exclusively the thread e, and that below the fabric is exclusively the thread z. It may be made by hand in a manner analagous to the method of making it by the machine, as follows:

Take two pieces of fabric, c, and an ordinary needle, h, threaded, and a small ball of thread, f; tie the ends of the threads together, leaving an inch or two of the thread z unrolled from the ball; thrust the needle h head first through the fabric, withdraw it slightly, seize the loop thus formed by the upper thread, enlarge it, and pass the loop around the ball, as in fig. 1, withdraw the needle entirely from the fabric, and draw up the loop, so that the interlocking point of the two threads e and z will be in the centre of the fabric. A succession of stitches thus made will form a seam, presenting the same appearance upon each side, a single line of thread extending from stitch to stitch. Two and one-half yards of thread is a fair average for a yard of seam. The seam is

very firm, cannot be raveled; and will not rip, any more than hand sewing.

In the Wheeler & Wilson machine, this stitch is formed by a needle with the eye near the point, and a "rotating hook." A loop of the upper thread upon being thrust through the cloth, is seized by this rotating hook, carried forward, enlarged, and passed around a bobbin, carrying the lower thread in the same manner as the loop is represented as being carried around the ball in the foregoing diagram.

Fig. 2.

5, in fig. 2, is the "rotating hook" referred to. It is formed by cutting away a portion of the periphery of the circular concave disc upon the end of the arbor. (See fig. 5.) a is the point of the hook. From a is a diagonal groove across the periphery of the hook to the point b, where the edge is beveled off; 35 is the needle, with the eye near the point, that has been thrust through the fabric, with the thread e, the loop of which has just been entered by the point of the hook a. The lower thread is carried on a double convex metalic bobbin, to lie in the concavity of the hook, and held in its position by a concave ring, (not here represented,) between which and the concave surface of the disc it lies. No axis supports it, so that a loop of thread can pass around it, as around the small ball of thread in the last diagram.

Fig. 3.

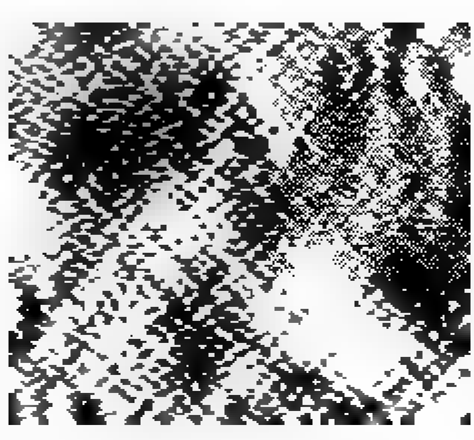


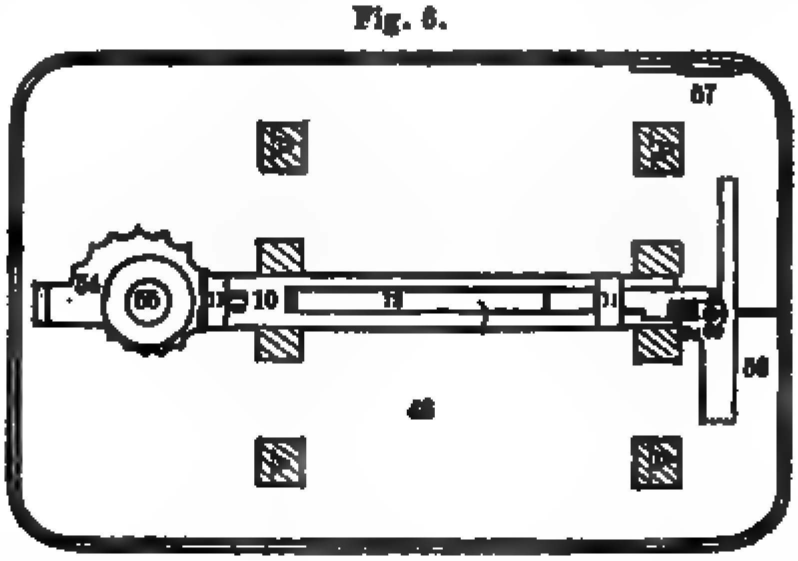
Fig. 3 represents the hook as having made about two-thirds of a revolution, and the lower thread z, extending from the lower surface of the fabric to the bobbin, in the concavity of the hook containing it. The upper thread e, extends through the fabric, from a previous stitch into the concavity of the hook, behind the bobbin, around the hook at the point b, thence diagonally along the groove to the needle 35.

Fig. 4.

As the hook further revolves to the position indicated in fig. 4, both lines of the loop e are upon the same side of the hook. The line of thread that extended on fig. 3, along the groove of the hook by b, has slipped off at the termination of this groove, and fallen in front of the bobbin, so that the loop of the thread e extends behind the bobbin, around the point of the hook a, and across the front of the bobbin to the needle 35, thus surrounding the bobbin, and inclosing the lower thread z. The hook further revolving, the loop e slips from the point of the hook, and being drawn up by the enlargement of the succeeding loop, (see fig. 2,) interlocks with the lower thread z in the fabric, and forms a stitch similar to those represented in the several figures above.

To illustrate more clearly the method of making the stitch by the Wheeler & Wilson machine, we have exhibited the rotating hook 5 and the bobbin carrying the lower thread, detached from the machine.

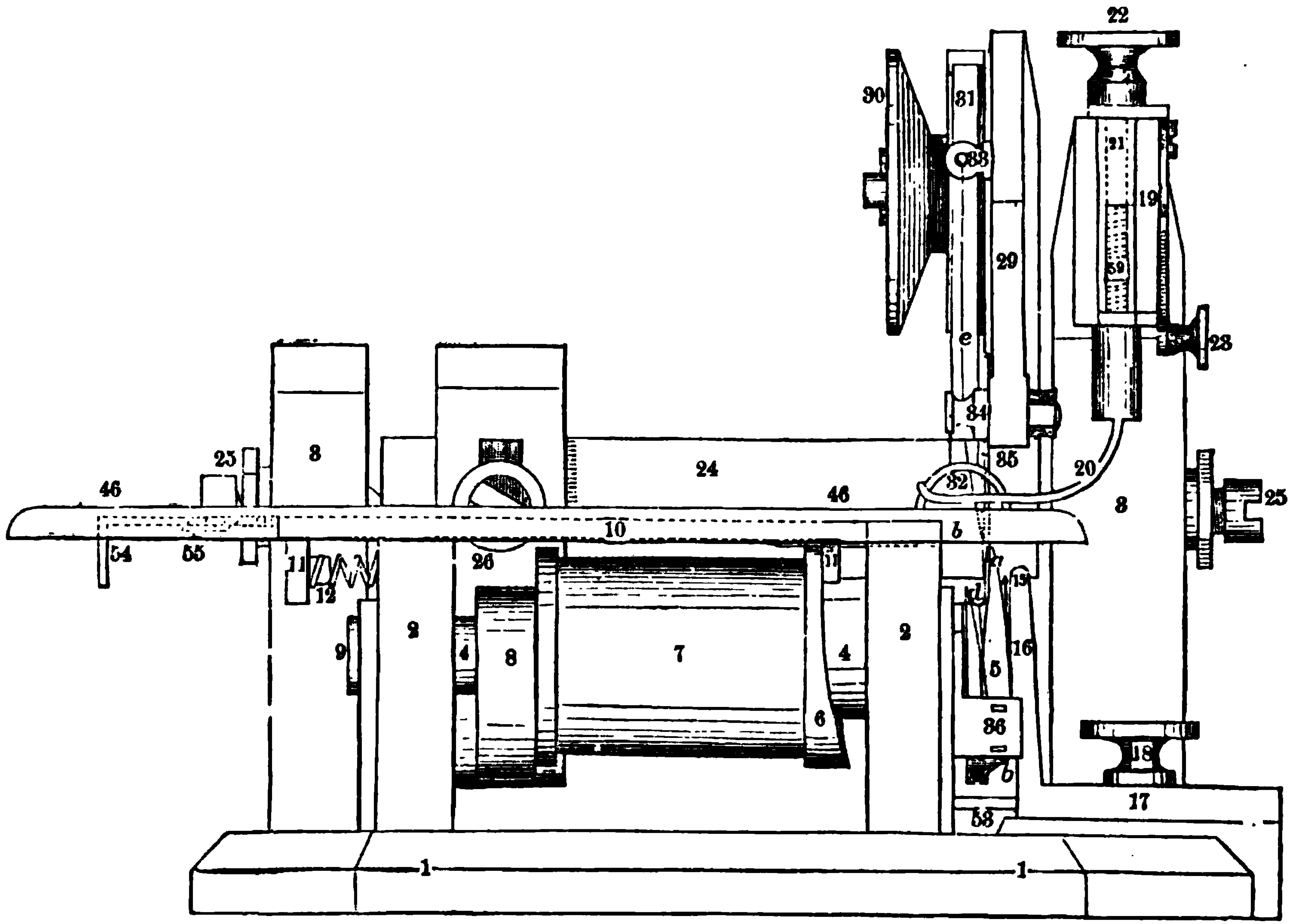
Fig. 5.



In subsequent figures the same parts are represented in their proper places, combined with the other parts of the machine,

WHEELER AND WILSON'S SEWING MACHINE.

PERSPECTIVE VIEW OF THE MACHINE.



OUTLINE VIEW OF THE MACHINE.

SECTIONAL VIEW OF THE MACHINE.

and which are respectively numbered as follows: 1, 1, the bed plate, supporting 2, 2, the front standards; 3, 3, the back standards; 4, is the arbor upon which are 5, the rotating hook; 6, the feed cam; 7, the band pulley; 8, the eccentric ring; 9, the spooling spindle; 10, the feed bar; 11, 11, ears of the feed bar; 12, the spiral feed spring, working between the left front standard and the left ear of the feed bar; 13, the feed tongue slotted in the feed bar, and furnished with 14, feed points; 15, the double convex metallic bobbin, containing the lower thread and held in the concavity of the rotating hook, by 16, the bobbin ring mounted upon 17, the ring bar, sliding in a groove in the bed plate and held by 18, the thumb screw; 19 is the fixed arm, projecting from the back standard and supporting 20, the cloth presser, attached to the piston in 21, the piston cylinder; 22 is the thumb screw of the cloth presser; 23, the lever of the cloth presser; 24, is the needle rocker, pivoted upon 25, 25, the centre screws; 26, the short arm of the rocker, hinged by 27 to 28, the connecting rod.

Upon the rocker is 29, the needle arm bearing, 30, the thread spool; 31, the spool brake; 32, the brake screw; 33, 33, the thread eyelets; 34, the needle yoke; 35, the needle. 36 is the loop check; 37, the spool pin; 38, a spool of thread; 39, thread guide; 40, tension pulley; 41, volute tension spring; 42, large seam gauge; 43, gauge screw; 44, screw for small gauge; 45, the fabric sewed; 46, the cloth plate; 47, table screw holes; 52, feed slots; 53, set screw; 54, feed stop; 55, stop pivot; 56, thread guard; 57, thread hold; 58, small gauge; 59, spiral spring of the cloth presser; 60, needle hole.

In constructing the machine, the lower surface of the bed plate is planed with perfect exactness, and made the plane to which all the planes and lines of the machine are adjusted. The standards 2, 2, are leveled to a plane parallel with the plane of the bed-plate, at a fixed height above it, and pierced in another parallel line for the arbor, 4, and grooved in a parallel line for the feed bar, 10. The bed plate is grooved in the same line for the slide bar, 17. The standards, 3, 3, are pierced parallel to the line of piercing 2, 2, for the centre screws, 25, 25; and the arbor 4, and the rocker, 24, are adjusted parallel to each other and to the plane

of the bed plate. The connecting rod 28, and the short arm 26, the needle arm 29 and the fixed arm 19, are adjusted at right angles to the lines of 4 and 24. The rotating hook 5, is a portion of the thread of a screw formed upon the periphery of the circular concave disk.

To the left of the notch *d*, is a portion of another parallel thread of the screw. The disk is cut away below the point *d*, into its concavity, so that the thread of the screw forms the clear point of the hook *a*. The groove between the two threads of the screw extends diagonally across the periphery of the hook disk to the point *b*, where the hook thread of the screw is entirely chamfered off, and the groove disappears. The two concave surfaces of the disk and the slide ring 16, contain the bobbin 15. The needle 35 is curved to the arc in which the end of the needle arm vibrates. A perfectly rectangular figure is formed; the arbor 4, forms one side; the connecting rod 28, a second; the rocker 24, the third; and the needle arm with the needle 35 and the rotary hook 5, the fourth. The opening is made for sewing between the needle and the hook.

The working parts are secured to a frame constituted by the bed plate 1, 1, and the standard 2, 2, and 3, 3. The slide ring 16, is adjusted by the set screw 53, to retain the bobbin 15, and allow it to turn freely in the concavity of the hook disk. The needle 35 is adjusted with its head in the needle yoke 34, to vibrate through a small hole 60, in the cloth plate 46, and so that the point in its rise will bring its eye just below the point of the hook *a*, which revolves so close by the side of the needle 35, that nothing can lie between them as they come opposite each other. The eccentric ring 8, through the connecting rod 28, and the rocker 24, vibrates the needle arm so that it begins to rise just before the point of the hook reaches the needle.

Fig. 10.

The pressure of the fabric upon the thread about the needle as it begins to rise, loops the thread slightly upon the right of the needle. This loop is caught, enlarged and carried around the bobbin, as before illustrated. When the loop of thread is about to slip from the hook, as represented in fig. 10, it is checked for an instant until

the hook completes its full revolution and enters the next loop, in the process of enlarging which, it draws up the loop already formed. 36, the loop check employed, is a small piece of leather, or an equivalent, held in contact with the periphery of the hook, so that the loop cannot pass until the chamfered part *b* of the hook reaches and frees it, as it does just as the hook enters the next loop, as represented in fig. 2. This rotating hook is of singularly ingenious, simple and novel construction, and is equivalent to several pieces of elaborate machinery. It performs the three operations of enlarging the loop of the upper thread, passing it around the bobbin, carrying the lower thread and tightening the preceding loop.

The bobbin, 15, is placed in its proper position, with the thread flowing from the top towards the front of the machine, in which direction it revolves slowly. The thread is wound upon this bobbin with great facility, at the rate of one hundred yards per minute. For this purpose it is placed upon the spooling spindle, 9, and the spool of thread upon the spool pin, 37; the thread is then re-wound upon the bobbin by working the treadles, as in sewing. The upper thread may be used from the original spool, 38, or from another spool on which it has been re-wound.

The tension of the two threads used, is a point of importance. To form the lock stitch perfectly, the point of interlocking the two threads, should be drawn to the centre of the fabric sewed, so that each thread may be held firmly, and the seam present the same appearance upon both sides of the fabric, a single line of thread extending from stitch to stitch. The tension of the lower thread is rendered sufficiently great by the friction between the surface of the bobbin, 15, and the rotating hook, in the cavity of which it is placed, the two revolving in opposite directions. The tension of the upper thread must be so adjusted as to draw the lower thread into the fabric in the formation of a stitch. Were the spools of thread always uniform, and the thread uniformly wound upon them, there would be no difficulty in using the thread directly from the original spool. But this is not the case. In fig. 7 it is shown as fed from the original spool, 38, through the thread guide, 39, to the tension pulley, 40, and thence through the eyelets, 33, 33, to the needle, 35. The tension is attained by he volute spring, 41, pressing upon the pulley, 40, which may

be regulated at pleasure by the thumb screw at its end. In fig I, the tension is attained by the brake, 31, upon the spool, 30, which is regulated by the thumb screw, 32.

The next point of importance is the "feed." This is that part in the operation of the machine, by which the fabric to be sewed is moved forward, and the length of stitch regulated. The length of stitch does not depend at all upon the speed of the machine, but upon the "feed" alone.

The "feed" consists of a bar, 10, working in grooves in the front standards, and directly beneath the cloth plate, 46. It has a slot nearly its entire length, in which is pivoted, near the left end, a tongue, 13, with its right end resting upon the right front standards, and armed with two rows of small points, 14. The relative position of the feed bar and its appendages to the cloth plate, is best seen in fig. 6. The cloth plate is furnished with a slot, through which the feed points, when raised, project, and enter the fabric, held upon the plate by the cloth presser, 20. The feed is worked by the cam, 6, which rotates with the arbor, 4. As this cam revolves, the swell of its periphery strikes the under surface of the feed tongue, 13, and raises the feed points, 14, through the slot, 12, while the swell on the right side of the cam, 6, presses upon the right ear, 11, of the feed bar, and throws it forward. The cam further revolving brings a point of depression both in its top and its side next to the feed bar ear, when the points drop below the surface of the cloth plate, and the feed spring, 12, throws the bar back to the left against the feed stop, 54, and the next revolution of the cam throws it forward again. It will be observed, that while the needle penetrates the cloth, the feed points are below the surface of the cloth plate, and intermit their action upon the cloth. Hence the needle constitutes a pivot, upon which the fabric may be turned to sew a curved seam of any radius.

The feed points rising and penetrating the cloth at each stitch, their movement forward determines the length of the stitch, which is graduated by regulating the play of the feed bar. The play of this bar is limited to the difference between the widest and the narrowest parts of the feed cam, 6, which is about one-fourth of

an inch, and may be graduated to any length, within that limit by the feed stop, 54, against which the feed bar is thrown by the feed spring, 12. As the widest or the narrowest part of this eccentric stop is turned towards the feed bar, greater or less play is permitted, and longer or shorter stitches are made. This stop is turned with great facility while the machine is in motion, by the lever with which it is furnished.

The machine is mounted upon a neat work table, and driven by sandal treadles and band, 7. The fabric to be sewed, 45, is laid upon the cloth plate, 46, beneath the needle, and held by the cloth presser, 20. The threads being adjusted, the machine is touched into motion by a gentle pressure of the foot upon the sandals. The cloth moves forward from left to right, and the sewing is accomplished in the manner above described. There is no limit to the number of stitches that may be made in any given time. The driving wheel is graduated ordinarily so as to make five stitches at each tread, so that from six hundred to one thousand stitches per minute are readily made. The bearings and friction surfaces are so slight, that the propelling power required is merely nominal. The rotating hook, feed, bobbin, and other parts at all subject to wear, are made of finely tempered steel; the other parts of the machine are tastefully ornamented or heavily silver plated.

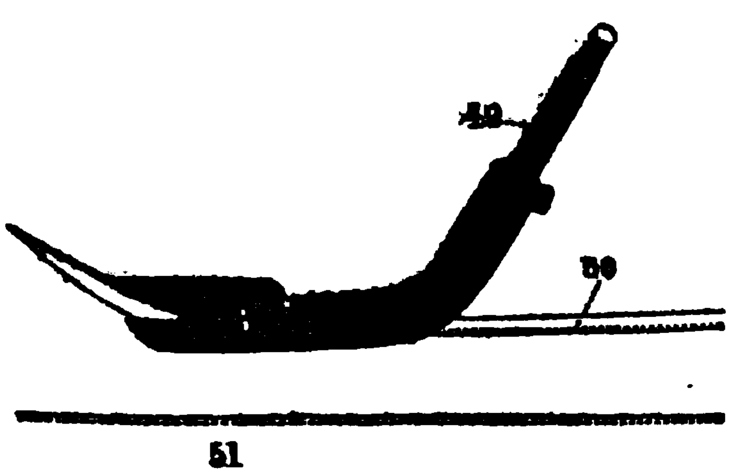


Fig. 11. The Hemmer.

Various appliances are furnished for regulating the width of hems, etc., as 42 and 58. The seam guide, 42, is attached to the fixed arm, 19, by the thumb screw, 43, and extends down over the cloth plate, with various projections for guiding the work. It is slatted and jointed, so as to be adjusted in various positions. A smaller gauge, 58, very commonly used, but not in conjunction with the larger, is fastened to the cloth plate at the screw hole, 44, by the thumb screw, 43. Another appendage is the hemmer, 48. It is used in the place of the cloth presser, 20, and is, in fact, a cloth presser so convoluted, that as the edge of the cloth passes through

it to be sewed, it is turned down as in ordinary hemming, and is beautifully stitched. Hems of various widths are turned, as 50 and 51. Other attachments are furnished for special purposes.

The principles involved in the construction of this machine, and the details elaborated, are the fruit of the highest inventive genius and mechanical talent.

It is the invention of Mr. A. B. Wilson, of Cortland county, in this State. His first method of making this double thread lock-stitch, was by a double pointed shuttle which carried the lower thread wound upon a small bobbin within it. The loop of the upper thread upon being thrust through the fabric by the needle, was entered by the shuttle and the line of the lower thread passed through it. Many difficulties were encountered in sewing by this method. It involved heavy, noisy and cumbersome machinery to drive the reciprocating shuttle; the tension of the lower thread was difficult of adjustment, and varied with the speed of the machine; hence some stitches were more tightly drawn than others, an objection most evident upon fine material. This fact, coupled with the circumstance of the thread breaking by the sudden jerk of the shuttle before it could unwind from the bobbin, rendered it inadaptable to fine work. Each stitch was completed before another was commenced, hence the slightest lateral movement in the cloth, very likely to occur, threw the next stitch out of an exact line, and gave the stitches a slight zig-zag appearance. The lubrication of the shuttle race oiled the shuttle, the thread and the seam.

Mr. Wilson, therefore conceived the idea of making the stitch by a mechanism totally different in principle, which should obviate all of these objections. In his first invention he had used his superior "rough surface feed," already described. From the "baster plate feed," from which the fabric was suspended upon pins projecting from a plate which was moved forward and a seam formed the length of the plate, and a longer seam by the repetition of this process; the change was to a wheel armed with pins, projecting from its periphery. This gave the advantages of an endless feed, but the pins penetrating the cloth in one place and the needle in another, it could not be well turned to form curved

seams of small radius. The "rough surface feed," with the "yielding spring pressure," invented by Mr. Wilson, secured the desired results. It consists of a wheel with the surface roughened, or of a reciprocating bar furnished with a toothed tongue, as in the Wheeler & Wilson machine, above described. The reciprocating bar is superior to the wheel, inasmuch as its operation upon the cloth is intermitted while the needle penetrates the cloth, and constitutes a point on which the fabric may be turned. With the wheel feed the fabric is continually pressed upon the wheel, and hence not so readily turned. The yielding spring presser, as represented in the machine above illustrated, is valuable, as the fabric is not only held but the presser yields to the varying inequalities in any seam.

Another excellence is embodied in Mr. Wilson's invention, inasmuch as the fabric is always held firmly to the plate by the threads, which prevents any play, and hence, secures a succession of stitches in a regular line. In his shuttle machine, a stitch having been completed the lower thread was slightly slackened, affording a chance for the fabric to be moved laterally, and producing a zig-zag irregularity. It will be seen from the foregoing illustration of Mr. Wilson's invention, that neither thread is ever left loose. The rotating hook is continually drawing upon the loop of the upper thread directly, and holding the lower thread taut by friction with the metallic bobbin. Thus the fabric is held steady, and the regular succession of stitches secured.

The equalization of the tension of the two threads, was a great difficulty with which Mr. Wilson had to contend in his shuttle machine. The lower thread from the shuttle must be unrolled by jerks at each movement of the shuttle. Were the brake upon the bobbin in the shuttle too strong the thread would be broken; were it too weak too much would be unrolled. It would vary also by the different velocities of the shuttle. This defect would not be so obvious on thick fabrics, as it would not be evident whether the lock of the thread were in the centre of the fabric or near the surface, except by the looseness of the thread upcn one side—still the sewing would be fair. The great difficulty was with thin fabrics, where the "lock" must be in the centre of the

fabric, or the loop of thread would be seen on the surface of the seam. Mr. Wilson obviated this by giving to the lower thread a uniform tension sufficiently strong to keep it taut, and regulated the position of the "lock" by greater or less tension upon the upper thread. This mechanical arrangement eliminated one grand difficulty in regard to the tension of the threads and the position of the "lock," which may be upon either surface or in the centre of the fabric, at the pleasure of the operator. Should it be desirable to form a seam to be taken out or for gathering, the tension upon the upper thread is left slight that the lower thread may not be drawn into the fabric, but lie upon the lower surface, passing through loops of the upper thread.

Mr. Wilson found his new invention so superior to his shuttle machine, that he entirely abandoned the latter, and perfected his new invention, which he patented in 1852.

[*A gold medal having been before awarded. Diploma.*

(MACHINERY No. 9.)

MISCELLANEOUS.

Rolland's Patent Baker's Oven.

E. Fabrequettes, A. Bernard and Elias Ponvert, 51 Dey street, New-York.

The Rolland Oven is of circular form, and heated by means of an independent furnace, which thus admits of any combustible material being used. From this furnace the heat circulates around the enclosure reserved for the baking of the bread by means of tubes placed in the lower part, connecting with vertical flues in the thickness of the wall, and a double metallic ceiling, which supersedes the top or upper part of the old ovens. The bottom part or floor is moved horizontally and vertically, and constitutes a revolving platform of iron work, covered with a layer of baked clay. A handle or winch on front of the oven, very easily transmits to the pivots of this floor the movement of rotation, and brings successively to the mouth of the oven, within sight of the eye and reach of the hand, the place which each loaf should occupy. The distribution of the heat is perfect, and regulated by a register; a thermometer measures its intensity, and indicates in an invaria-

ble manner, the moment at which the bread ought to be put into the oven. A gas burner or a lamp, placed in one of its sides throws its rays into the interior. A cast iron tank on the top of the oven and heated by it contains the hot water necessary for the mixing of the dough.

The baking is perfect, regular and continuous; every loaf is exposed at the same time to the heat of the oven, and the crust not being in contact with the ashes or embers, is always strictly clean. An apparatus is made to fit upon the platform, to square it so as to allow the baking of square loaves, without crust all around.

The advantages of Rolland's oven over the old system are—

1. A discontinuance of the drying of the wood before heating.

2. The means of making use of every kind of combustible matter.

3. Great economy in the expense of heating.

4. Suppression of many risks of fire.

5. Discontinuance of the laborious cleanings of the floor of the oven at every batch.

6. An easier plan of putting in and drawing out the bread, with shorter and more manageable implements.

7. A baking which is regular, capable of being prolonged, and very easy to manage.

8. Production of loaves free from all traces of ashes, embers, &c., presenting in a word, a very good quality of well baked bread, with a fine appearance and perfect cleanliness.

9. Heating the water necessary for the preparation of the dough, by means of heat, which by the old means is lost.

10. A wonderful economy of labor and time, this being capable of baking 24 batches in 24 hours.

11. No liability to get out of order, the machinery being so very simple.

12. The construction of this oven is such that none of the steam or vapor arising from the dough when baking is lost, an advantage which every practical man knows is very important to the baking of bread. [*A large silver medal awarded.*

MACHINERY No. 10.

GAS, ELECTRIC MACHINERY, &c.

McDougall's Portable Benzole Gas Machine.

S. T. McDougall, 335 Broadway, New-York.

The above cut exhibits the appearance externally of the machine for the production of gas from Benzole and other hydro-carbons.

The attention of the public is invited to the following considerations and proofs in favor of this useful discovery, as a substitute for all other modes of lighting dwellings, stores, factories, and other buildings where light is needed. The size of the machine necessary for a supply of gas sufficient to light a common dwelling is such, that it will not occupy a space of more than two or three feet square.

The cut represents the whole apparatus, propelled by a weight attached, which winds up like a clock; and thus wound up and

charged with the composition, is ready at a moment to furnish gas, by the simple turning of a stop-cock, and igniting it at the burner. The moment the stop is opened, the machine is acted upon by the weight, which operates an internal cylindrical pump, bringing the air which passes through the machine in contact with the liquid, and thus generating the gas; and no more gas will be generated than is consumed by the burner or burners ignited, the action of the machine being in proportion to the gas consumed. It is so constructed as to be unlikely to get out of order, is very durable, and can be attended by any person in less time than is required or commonly bestowed in cleaning and trimming the common lamp.

In one end of it is a glass window, through which the composition is seen, and by which you can always tell when it is sufficiently and properly filled with the fluid. The temperature of the mixture, and also that of the surrounding atmosphere, to produce the best light, with this gas, as with all others, should be about 70° Fahr., and if the mixture, by the addition of fresh Benzole, should be reduced below this standard, it may quickly be brought up by igniting the jet attached to the under side of the machine. Recent improvements in the manufacturing of Benzole and other hydro-carbons, make it almost unnecessary to use heat under the machine. Each machine has a thermometer in the end of it, to indicate the temperature, and the only attention requisite for use, is to keep it wound up and properly charged with the Benzole from time time, as the amount consumed may require. Fair and full experiment has proved, that this composition produces not only a far better and cheaper light than other gases, but that the cost is less even than that of tallow candles.

Other considerations, however, in the judgment of many, will commend it with even greater force than those derived from its comparative cheapness.

Its quality is superior to all other kinds of artificial light. It is far less explosive, and has none of that offensive smell common to coal and rosin gas, and is entirely devoid of all those impurities peculiar to rosin gas, which obstruct the pipes, blacken the walls of the apartments, and render the use of rosin gas so very objectionable.

It will also evolve a greater amount of illumination from the same volume of flame, affording a rich, yellow, bright flame, the refracting power of which is greater than that of any other artificial light.

Under all these advantages, there can be no extravagance in predicting, that it must come rapidly and generally into use; and in adding, that the important ends of safety, convenience and economy so long desired, are in its introduction fully attained.

[*A bronze medal awarded.*

Woodworth & Co., Portable Gas Works.

C. R. Woodworth & Co., 74 Wall street, New-York.

This machine is remarkable for its extreme simplicity, its safety and economy, as also for the practical and extraordinary results.

which it unquestionably achieves. It is no more complicated than an ordinary cooking stove, and requires no more skill or capacity to manage it. It is not liable to derangement, as a kitchen range or a furnace, and does not require as much mechanical skill to put it in order, should it by any accident become deranged. In safety, there is no conceivable risk from the working of the machine, or in the use of the gas. In economy, the light produced from this gas costs less than that from oil or candles. One-half a cent. per burner, for an hour's consumption, is a large estimate for this gas, while in illuminating qualities it is not surpassed by the coal gas of any city in the Union. It is in all respects exactly what those require, whose taste, profession or occupation calls them to the country to reside, and that is, a safe, good and economical light. The cut represents a machine of the size mostly used in private dwellings, and consists of an oil can or reservoir for the raw material, a stove, in which is set the retort or generating apparatus, a siphon or condensing box, the water tank or gasometer.

The reservoir is a simple cylindrical vessel, containing the oil from which the gas is generated. The retort is an iron hollow cylinder, with a spheroidal bottom and flat cover, bolted and screwed to a projecting rim. The stove containing the retort is of sheet or cast iron, arranged upon the most approved plans to economize the heat. The siphon box, or condenser, is a cast-iron vessel, with a moveable lid bolted and screwed upon it. This is divided into compartments, and half filled with water, with a siphon attached, so as to keep the water at all times to its proper level. The water tank, in which the gasometer floats, is made of wood or brick, and sunk to the level of the ground.

The working of the machine and management of it, require no more than ordinary skill, and may be safely entrusted to a domestic. A fire is made in the stove as in an ordinary furnace, and the retort is heated to a bright cherry-red heat. The cock is then opened to allow the oil to pass in through the pipe from the reservoir, upon the heated sides and bottom of the retort, where it is instantaneously converted into gas.

Ascending from this decomposing chamber, the gas is forced through a substratum of chemical substances, suspended upon an

iron grating for its purification, into a vacant upper chamber, thence it is conducted by an iron pipe into the condensing box. This iron pipe, passing through the cover of the condensing box, descends below, and discharges the gas into the water of the condensing box. Thence it rises into the vacant chamber above the water, before it finds its exit, and thence into the gasometer ready for use.

The material used is an oil from rosin, though not what is commonly called rosin oil. It is an earlier, cheaper and better product of collophony, decomposable at a lower and therefore a more economical degree of heat. There cannot be found in the whole range of chemistry a compound more richly laden with illuminating qualities, or yielding gases more innocuous in respiration, or less injurious to furniture, for it contains neither carbonic acid nor sulphurated hydrogen.

The supply of this material is inexhaustible, and any anticipated demand can scarcely enhance the price. It is now delivered at the company's works, in New-York, at eighteen cents per gallon. Each gallon of the raw material may be safely estimated to make one hundred cubic feet of gas from this machine. The apparatus, as above described, with a gasometer of the capacity of 300 cubic feet, will contain an average of a week's supply to an ordinary family the year round, and is sold at the company's works in New-York, complete for $350. They are made, however, of any required capacity, and adapted in form and size to the necessities of the space they are to occupy, and the requirements of the burners they are to gratify. These requirements and necessities are so varied, and so materially increase or lessen the cost of the whole machine, that it is impossible to furnish, as the company are often asked to do, a tariff of prices for the various sizes. The cost of any sized machine can always be had by application at the office of the company, in person or by letter, or by application to either of the general agents of the company. Such application should always be accompanied with a statement of the quantity of gas to be consumed each night, and the number of nights required to be supplied.

The quantity of gas can be readily estimated, basing the calculation upon a consumption of two and one-half cubic feet per

hour for each burner while burning. In applications for machines for the supply of factories, foundries, schools, colleges, churches and hotels, it would be better to give the number of burners, and the time they are in use.

The foregoing description of the machine for private dwellings will suffice for the larger sizes required for factories, colleges, hotels, &c. The application of the principle is the same, its simplicity is in all things retained, its efficiency is in nothing lessened. Larger generating surface, and an economical application of the heat, is secured by arranging the series of retorts in a circular bed, each communicating with the same reservoir of raw material, and forcing its generated gas into the same gasometer.

The illuminating qualities of two feet of rosin oil gas, is equal to that of four feet from coal. This is not only true in theory, but holds good in practice. The burners for oil gas consume but two feet of gas per hour, while those for burning coal consume from four to eight feet per hour, under the same pressure. The light from one gas burner is equal to that of sixteen sperm candles.

To the manufacturer it is desirable as a mere matter of economy, without reference to its protection from risk of fire, necessarily incurred by the use of oils and candles.

To schools, colleges, churches and hotels it provides, what in the cities is considered an indispensable luxury, a good gas light.

REPORT OF THE JUDGES ON PORTABLE GAS WORKS.

Portable Gas Works exhibited by Saunders Coates and C. R. Woodworth & Co.

Both of these parties were last year also exhibiters, and each now presents material improvements over his own apparatus, as then submitted. Your committee, as at present constituted, is partially the same as at that time, and may therefore be permitted to remark, that from want of proper explanation on the part of Mr. Coates, the distinctive features claimed by him were not last year made apparent to them, and hence his dissatisfaction with the award then made, viz, that of equal merit in the two.

The Maryland company have now introduced the feature wherein last year the machinery of Coates' differed principally from theirs,

that is, cleaning the retort, by the admission of atmospheric air to burn out the residuum arising from the decomposition of the oil. His method, and which he still uses, was to admit air by simply raising one side of the cover a little, whenever the cleaning was requisite, and opening at the same time a communication from the interior of the retort to the chimney, whereby a draft was obtained. The air so admitted caused a direct combustion of the residuum. The products of this mainly pass off into the chimney, a slight deposit only being left on the bottom and sides of the retort, in the form of ashes, and this is not sufficient in quantity to require removal oftener than once in three or four weeks.

The committee do not understand that the method of effecting the same purpose, as now exhibited by the Maryland company, possesses any advantage over that of Mr. Coates. It is certainly not so manageable by the class of operatives by whom these portable generators are professedly to be worked. If introduced into the large gas manufactories where the D retort is altogether used, their method probably would be the one selected, but in the "portable work," as they are called, the cauldron shaped retort has been generally, and for good reasons, preferred; and it is with these only we have to do at present. The apparatus of Mr. Coates has this year another and a marked improvement, being that in which it is, as before remarked, different from his exhibition at our fair in 1856. This lies in casting the retort uniformly thin throughout its entire body, and then obtaining the thickness of bottom requisite for insuring equality and steadiness of heat, by putting in a quantity of lead. This is soon melted, forming a level surface; and as upon this it is well known that the oil is not so readily decomposed as upon iron, he places a plate of that metal upon the lead, where of course it floats. By this arrangement, the retort being of equal thickness throughout, is (1) not liable to be cracked in getting up a heat; (2), if the bottom sags, as from the heat it is apt to, the lead and plate of iron upon it still preserves the necessary form of surface requisite to insure the proper distribution of the oil; and, (3), the only part which wears out rapidly, viz, the iron upon which the decomposition is effected, may be cheaply replaced.

Both of these portable generators are now prominently before the public, and as neither claims to produce a better gas than the other, the question of comparative merit is narrowed to that of economy of working, and adaptedness to be safely operated by the unskilled hands to which such apparatus must be necessarily entrusted.

Your committee, while warmly commending both, as highly meritorious and useful, do not hesitate to express their opinion, that the meed of *best* for the purposes designed, fairly belongs to the apparatus submitted by Mr. Coates.

Improved Argand Gas Burner.

W. W. Batchelder, 34 West 34th street, New-York.

Mr. Batchelder exhibits an argand gas burner, which produces a steady and smokeless flame, without the aid of a chimney. It is a very important and long desired improvement on that kind of burner, for since the introduction of gas very many devices have been offered to the public for obtaining a steady argand light. Your committee are not aware that, hitherto even an approximation to this end had been made, without the employment of a chimney, and, under the intense heat, these chimneys are constantly breaking.

Mr. Batchelder's burner has also another and important feature—that this steady light is obtained at a very low pressure of the gas—thus economizing in that.

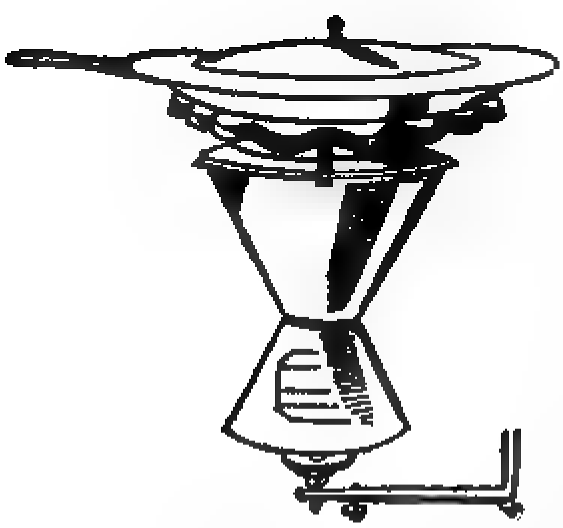
The inventor claims a greater amount of light from an equal quantity of gas than is offered by any other burner, and proposes to afford the committee an opportunity of verifying his assertions. This they will gladly avail themselves of, and in case he should succeed, which now appears highly probable, they will make a more extended report.

Had they been enabled to verify his claims they would unhesitatingly have recommended the gold medal of the Institute, but as at present advised, they propose that the next in grade be awarded, and with the understanding that it may yet be raised.

[*A silver medal awarded.*

Demorest's Gas Cooking Stove.

W. J. Demorest, 375 Broadway, New-York.



For general cooking purposes, heating flat irons, boiling, frying, stewing, &c., or by placing on the oven, will bake or roast, &c. For summer use, either for cooking, washing, or ironing, it is convenient and economical. If you have gas you cannot afford to be without it.

These stoves are constructed on peculiar scientific principles, so as to furnish the greatest amount of heat with the smallest amount of gas, and securing an absolute combustion.

The judges remark in the matter of cooking and heating by the use of gas, that the public should be advised of the importance of careful attention to the ventilation of the rooms in which such apparatus is employed.

This has not usually been done, and hence many are dissatisfied with their cooking arrangements because of the headache invariably accompanying its use. Such need not be the case, and were this fully understood, the use of these as domestic implements would no doubt be largely increased. Your committee anticipate such further enlargement of this line of apparatus, that

VERGNES' ELECTRO DYNAMIC MACHINE.

CHICHESTER'S ROLLER GIN.

soon a large portion of the family cooking will be effected by it, at least in the summer season. [*A bronze medal awarded*

Vergnes' Electro Dynamic Machine.

Maurice Vergnes, 710 Broadway, New-York.

This machine is destined to transmit power of electricity, with the greatest possible effect, contrary to all the others which have been made for the same purpose, the more the dimensions are increased the less it requires proportional electricity.

The machine represented by our engraving was exhibited in February, 1854. A, A, is an electro magnet employed by the wire to excite it, and forming the diameter of a compact wheel; it revolves within the multiplying coil B, B, and C, C, forming only two multiplicators, divided as they appear solely for the admission of the axle ; they are alternately excited, so as to produce a rotary motion of the magnet A, A. The knobs E, E, E, E, receive separately the electricity of the magnet and the electricity of the multiplicators by two separate batteries. By alternately pressing the knobs D, D, the wheel changes its rotation.

Since 1854, this machine has been wonderfully improved, principally in this point, that the two multiplicators are not perpendicular to each other, but parallel, and that each of them revolve on the same shaft three electro magnets, one inside and two outside, and that those two systems of electro magnets are perpendicular to each other.

Prof. Vergnes, the inventor, is about to make other improvements in his machine at the Crystal Palace, in which the electro magnets have no less than eight feet in length, weighing two thousand pounds.

Chichester's Roller Gin.

Union Roller Cotton Gin Co., 6 Liberty street, New-York.

The machine represented in the accompanying engravings, figs. 1 and 2, is the invention of Mr. L. S. Chichester, and was patented on February 3d, of the present year. It is a roller gin. One roller is steel, the other is iron covered with firm vulcanised india rubber. The surface of the latter gives exactly the desired action on the fiber, but would be very ill suited to resist seeds.

A separate plate, therefore, is provided, the edge of which is near the bite of the rollers, and the seeds, while being stripped, lie in the angle, not between the rollers, but between this plate and the upper roller. By slightly curving upwards the edge of the plate a much greater angle is made to repel the seed than is secured even by the use of much smaller rollers, in the ordinary manner. to facilita te the action, a slight but rapid movement is given to the plate by a device, which will be described below.

Fig. 1 is a perspective view, and fig. 2 a section of Mr. Chichester's gin. A represents a steel roller, about twenty inches long, between the bearings, and about one and a quarter inches in diameter. B represents the plate described, and C the india-rubber roller, three inches in diameter. The plate B, is rigidly fixed upon a shaft, D. On one end of this shaft, D, outside the frame, is mounted a cross-piece, as represented, on which are two rollers D′ D′. A wheel, F, mounted on the shaft of C, is slightly scollopped, or cam-shaped, on its periphery, as will be observed on close inspection; and these successive elevations and depressions acting on the two rollers, D′ D′, give to the shaft D, and consequently to the plate B, a very rapid and positive vibrating motion, to the extent of nearly one-eighth of an inch at the acting edge. E is a small fan-wheel, which serves to remove any of the fibres which might adhere to C, and G is a stiff brush hinged to the points H, which serves also to strip the roller A. I, I, are thumb-screws, which serve to drive A down upon C with any required degree of pressure. J is a table or feeding-board, on which the cotton to be ginned is placed. A sufficient space is left between the edge of J and the face of B, to allow the seed to drop through and escape. The roller A is driven simply by "rolling contact" with C, and consequsntly there can be no difference in the velocity of their surfaces. The upper curved edge of the plate B, is about three-eighths of an inch from the bite, or point of contact, of the rollers. On first being pushed forward, the loose fibers of the cotton are drawn through by a simple contact with A, until they are caught by the bite and carefully separated from the seed, with just sufficient violence to keep the latter continually turning, an operation which is materially aided by the vibratory movement of B. To increase the effect of the rollers

in pulling the fibres, the surface of A is fluted, as represented in fig. 1; but the flutings, and, in short, all parts, of its acting surface, are kept very highly polished or burnished.

The capacity of this gin on fine cotton is 125 lbs. per day, and handles the fine sea island cotton (as stated by all planters and factors who have used it or seen it in use,) in a perfect manner.

[*A gold medal awarded.*

Machinery for Manufacturing Seed Cotton into Yarn.

George G. Henry, Mobile, Ala.

The judges to whom this subject was referred reported, that they examined the machinery affecting the improvement in the manufacture of yarns, for which Mr. Geo. G. Henry, of Mobile, has obtained a patent and is the proprietor of, and they find that it affects its purpose, in a manner both complete and convenient.

A gin, constructed so as to act in connection with a lapper of a cotton factory, and a lapper constructed to act in connection with a gin, are made, and form one machine. We have seen seed cotton, very leafy and trashy, fed to it; it gins the cotton from the seed, and the brush throws the lint on the cylinder of the lapper, which passes it continually to the beater, and this again throws the cotton to another cylinder, and thus passes the cotton through rollers, which finally roll it on a beam, and makes a lap, and in this form is prepared for the card. The gin is so constructed that the feed can be enlarged or diminished; and we have also seen clean cotton fed to it, and a lap obtained, as before described.

Our attention was called to the fact, that in even running the very leafy and dirty cotton through this machine, the usual dust and flyings of the gin, or the devil or lappers of the factory, was not discernible.

The brush of the gin throws leaf and motes down as usual, and the beater also does; but it is very obvious that this machine does not break up and pulverize the fibre to the point it takes in the preparation, as it is broken and pulverized by the machinery used in the factories to bring it to the same point, a lap. To illustrate

this, we may remark, that the adoption of this improvement obviates the necessity for the machinery and labor of packing the cotton in bales on the plantation, and the willow, the devil or picker, one set of the spreader and beaters, the preparation or breaker card of the factory, by which not only the labor of working them and the power required to run them is economized, but such cotton as it wasted in the process of packing, of sampling, or is thrown out and broken up by the willow, the devil, the spreader and beater, and the breaker cards (whose employment is excluded by this process) must be also saved.

On examining the laps from both the dirty cotton and the clean cotton, we observe, in consequence of the exclusion of this machinery, the fibre is not stringy, tufted or convoluted, but lays open and loose, leaving for the finishing card obviously lighter manipulations to complete the carding, than is required of the cards by the factory process. And the result is, as the fibre passes by this process immediately from the lap continuously to the cards, drawing, roveing, and to the spindles, avoiding the use of those machines necessary in the factories to open and disentangle it, which are very violent in their operations, the yarn must necessarily be made of longer and less broken staple, and be therefore a stronger and better yarn.

As to the cost of the machinery, it of course will be lessened to the extent of the portion excluded. The labor saved will be the hoisting seed cotton on the plantation into the second or third stories of gin houses, (as this machinery will be arranged on the ground floor,) the labor of packing the cotton bales, the labor of sampling, the labor of attending the machines of the factory, which are excluded, and also the power those machines demand, which is, altogether, a material figure.

Another important advantage which this improvement presents, is that the danger of fire, now so terrible at the cotton gin house, from lint cotton in it, is removed, as no lint cotton of any consequence will ever be in this spinning room; and also the danger from the burning of cotton factories is in a great measure, almost entirely, removed, as the devil or picker, which is here excluded, is the machine that occasions the most of the fires at the factories.

Then as the cotton planter will only require to buy the machinery and hire a spinner, making surplus labor available which he now has to attend the machinery, having already the locations, the power and seed cotton. Seeing the wide difference between the value of ginned cotton and spun yarn, we see no reason why this improvement in the manufacture of yarns shall not be rapidly adopted, and add a very important sum annually to the wealth and resources of the country. [*A silver medal awarded.*

MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS.

Kline's Patent Compass to overcome Local Attraction on Ship-Board.

Kline's Patent Compass Manufacturing Co., 92 Wall and 301 Pearl streets, New-York.

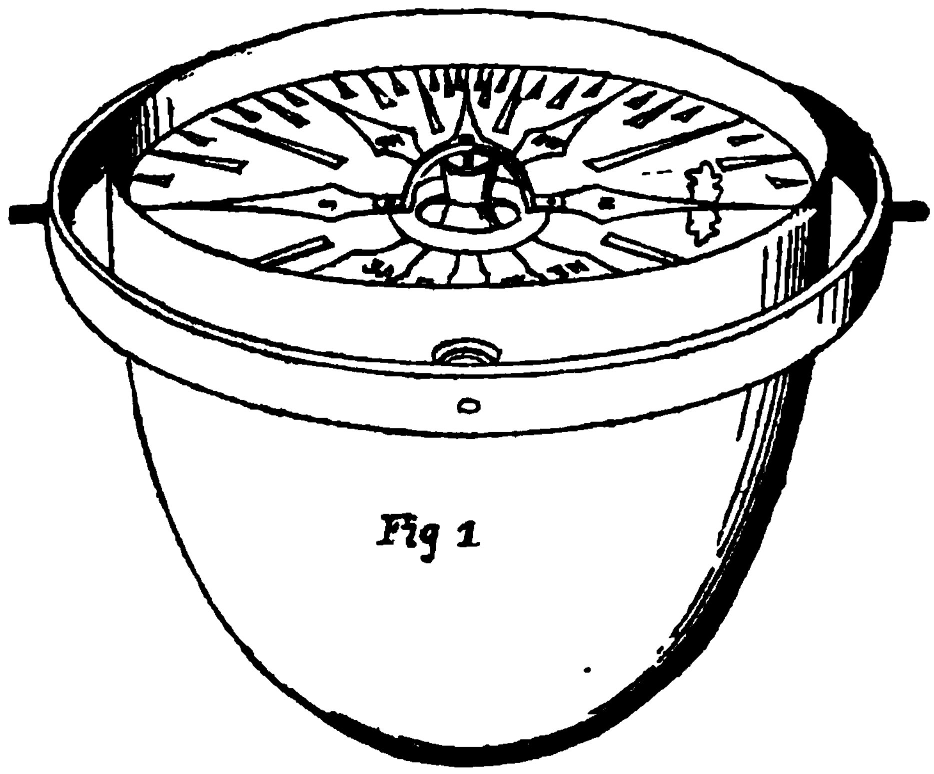


Fig 1

Fig. 2

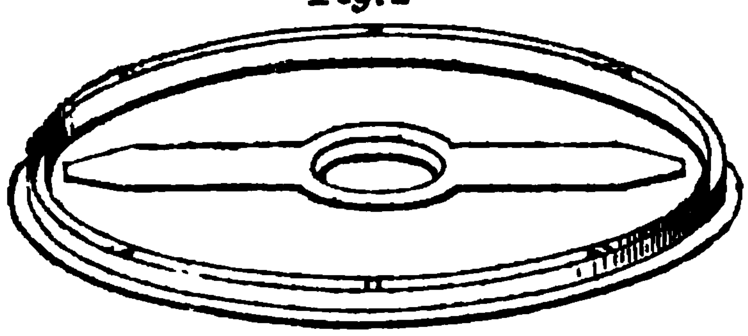
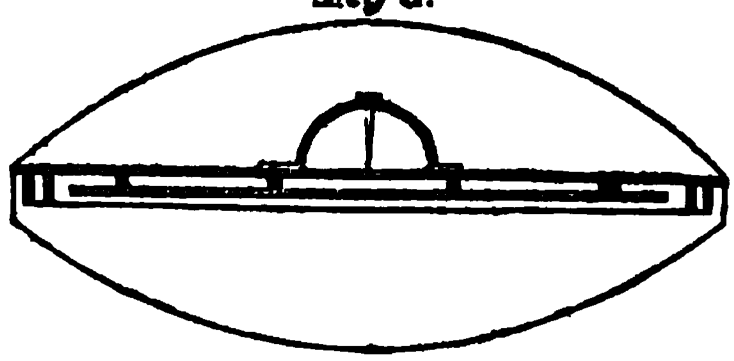


Fig 3.



REPORT OF THE JUDGES.

These compasses were carefully examined and subjected to severe tests. They are designed to overcome local attraction on shipboard. In an ordinary ship's compass a very perceptible deviation from the true inclination is caused by the neighborhood of masses of iron. The deviation is proportional to the nearness and the quantity of attractive matter. English vessels are subjected to an expensive process to adjust and compensate for these

local attractions. But the most careful adjustment may be rendered useless by a thoughtless change in the position of the attractive forces. Many accidents are attributed to these compass deviations. Especially in iron steamers are they to be dreaded. The exhibiters purpose to envelope the compass needle with a guard against these local attractions, that shall not at all affect its sensibility to the natural attraction of the magnetic pole. One of the compasses was thus tested. Deprived entirely of its patented addition, it was easily and immediately made to diverge from its normal magnetic position by the presence of a file or piece of steel, following it through an entire revolution. Part of the patented addition was then applied; at least one-half of the needle's susceptibility to local attraction was destroyed. It required care to make it follow the file, and its movements were very sluggish. When the *entire* attachment was made, the steel &c. used before had *no perceptible* influence, even when brought within half an inch of the needle, and only a large mass of iron, brought quickly near, had an influence, and that very feeble. Testimonials from navigators who had used this compass being shown to us, we consider it an invention of inestimable value; cheap in construction, and of easy application.

[*A gold medal awarded.*

Surveying Instruments.

H. W. Hunter, 169 William street, New-York.

This cut represents one of his transits for raiload and other surveying. The great value of hese instruments and the accuracy of their neasurements of angles, are due to two things: 'o the telescope, by which great precision in ighting to a point is obtained; and to the Verier scales, which enables minute portions of n arc to be read with ease and correctness. 'he telescope assists the eye in directing the ine of sight, and the Vernier scales in reading ff the results. There are also arrangements for giving slow and steady motion to the moveable parts of the instruments, which add to the value of the above. There is also a contrivance for repeating the observation of angles, which far-

ther lessens the liability to any inaccuracies which might occur. He also exhibited one of his improved adjusting tripods, which unlike those in general use, allows the theodolite, transit, level, &c., if not set over the line, to move from one to three inches in any direction without moving the legs of the tripod, thereby saving much time in setting the instrument.

The judges to whom these articles were referred, report that, these surveying instruments are considered the best of their kind exhibited—strong, solid, susceptible of easy adjustment in many ways, and well calculated for service. [*A silver medal awarded.*

Insulated Telegraph Wire.

Samuel C. Bishop, 181 Broadway, New-York.

This article being a gutta-percha insulated wire, protected by lead covering, is the most novel that has come under our observation. The manufacture of it would at first seem an impossibility. We have examined the machinery used to produce it, the two patents issued to the inventor, and various samples of its production. Molten lead is made to envelope gutta-percha wire, by hydraulic pressure, yet without destroying the valuable properties of the gum. This is effected by an arrangement which interposes a flowing stream of cold water between the lead and the gutta-percha, except at the moment of contact. By recent analyses in England, gutta-percha is found upon exposure to air to be converted into two substances of different chemical constitution, entirely different from the pure gum, being non-insulating and also brittle or rotten ; hence it has been discarded to a great extent in this country as an insulator to wire, unless protected from air. The English subterranean telegraphs, of gutta-percha covered wire, buried in wooden boxes, have been repeatedly destroyed by decay, while submarine wires kept from air have remained sound. The lead covering is air tight, and ten miles of the fabric can be made in a continuous length.

MISCELLANEOUS.

Reifercheid's Compound Solvent.

H. Reifercheid, 289 Broadway, New-York.

Report on Reiferscheid's compound solvent, for dissolving the incrustations found in steam boilers:

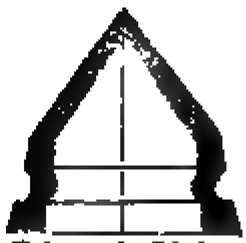
The undersigned judges, appointed to examine and report upon the effects of Prof. Reiferscheid's patent compound solvent, upon

the incrustations formed in one of the steam boilers used in the Crystal Palace, into which one barrel of the compound solvent was introduced, and continued therein for about five weeks—

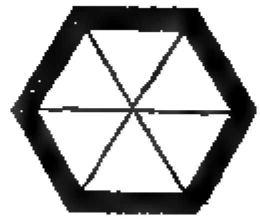
Respectfully report, that the water having been let out of the boiler, they examined the interior thereof, and found the same perfectly clean; the incrustation which was quite thick had been entirely dissolved and removed by the compound solvent. And they consider this a very valuable invention, and entitled to the highest consideration by all using steam boilers. They therefore recommend the same to the favorable consideration of the Institute. [*A silver medal awarded.*

Vault Cover.

IMPROVED CALLIOPE



Prismatic Light.



Top of Light.

Prismatic Vault Lights.

Geo. R. Jackson & Co., 199 and 201 Centre street, New-York.

The committee to whom this subject was referred reported that these lights were the best on exhibition.

[*A silver medal having been before awarded. Diploma*

Improved Calliope.

American Steam Music Co., A. S. Denny, agent, Worcester, Mass.

Calliope, designed for a Steamboat.

This instrument consists of a number of steam whistles of proper relative size to produce any desired musical scale, arranged in a convenient manner, and provided with separate valves, by the opening of which they are caused to receive steam or compressed air from a suitable pipe, chamber, or generator, the said valves being opened for the steam or air to escape to the whistles by finger keys, like a church organ, or by the revolution of a studded

iron cylinder. One important feature of this instrument is the peculiar kind of valve employed for the escape of the steam, and which cannot well be described in this article.

The iron cylinders for receiving the steam from the boiler, are about three inches in diameter inside, and into which the valves are firmly placed, and on each valve the whistle is as firmly screwed.

The valve is what is commonly termed a puppet valve, one end of the stem only protruding; and from this protruding end are ingeniously arranged galvanized wires, which extend to angles, at one end of the cylinder, and to which the finger keys are attached, the slightest touch of the finger of which will open the valve, when the sound is produced, and as soon as the finger leaves the key, the valve is closed by the pressure of the steam on the other end of the valve, or the studded iron cylinder acts upon the protruding end of the valve by the assistance of a hinged finger, which is attached to an arm, or angle of brass.

The valve is opened and closed instantaneously, thus making very quick music as well as slow.

Underneath the steam chest is placed a steam regulator which admits an equal pressure of steam from the boiler, and which is operated upon by the foot of the performer, thus making music of a soft and melodious sound, or may be swelled so that it will fill the air for miles around.

The pressure of steam usually used is from three to seven or eight pounds per inch, but may be used with twenty, forty, or even 100 pounds.

The instrument is well adapted to steamers, and is fast coming in use, especially on the ocean, lakes, &c., where the fogs are more troublesome than on the rivers, and the circus companies are now extensively adapting them with their travelling shows, as a matter of curiosity, as they most certainly are.

The amount of steam required to supply the instrument is so small that no engineer has yet been found who could compute it.

[*A large silver medal awarded.*

Ludlum's New Patent Life Boat.

Matthias Ludlum, Fair Haven, Vermont; Thos. Carter, agent, 205 Bowery New-York.

It embraces two floats, with air-tight compartments in each, which does away with the possibility of the entire float being destroyed; also prevents swamping or sinking; also, two or more self-adjusting valves, and a continuous air-chamber, made in compartments, so constructed as to be used for lockers and reservoirs.

The floats supercede the necessity of any additional frame-work or fixtures to secure it in its place. It may go overboard upon its end or side and will not swamp, but immediately right and free itself of water. There can be attachments made for covering, by using rack, pinions and awning, perfectly portable, and ready for immediate use.

The boat can be propelled by oars, sails, or paddle-wheel between the floats. It can be made of any material of which life-boats are usually made, and of any dimensions.

The self-adjusting valve that is spoken of is intended to discharge the water through the bottom of the boat. Also, to the fact that the apartments of the floats serve a double purpose.

First. In case of accident, water cannot enter and fill but a small space at the time.

Secondly. The apartments serve to render the floats unyielding to outer pressure.

The attachment of the floats prevents the boat from capsizing by persons getting on one side; but merely sinking the floats a little deeper in the water on which ever side they may get in.

Also the compartments on the inside of the boat, which can be used as lockers for carrying provisions and water, which no other boats have.

Also the stops, as a peculiar mode of rendering the locker, or inner chamber air tight. [*A gold medal awarded.*

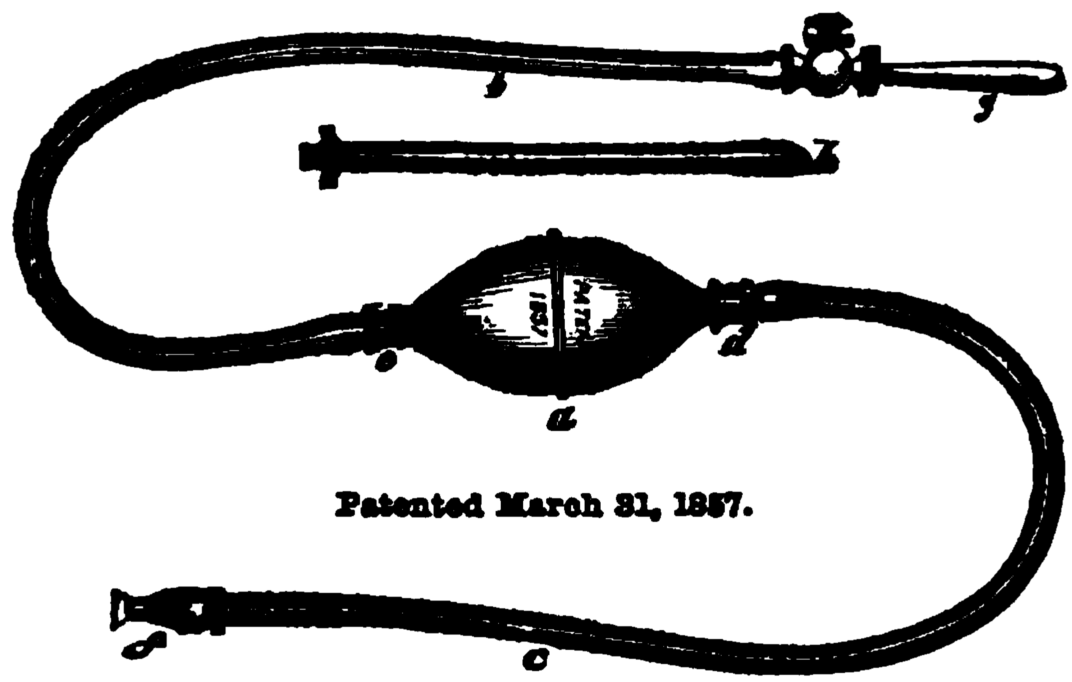
Smith's Steering Apparatus.

Samuel N. Smith, 182 South street, New-York.

This apparatus possesses many important advantages; simple in construction and not liable to get out of repair. The wheelman can leave it in any fixed position should occasion require it by a slight turn of the screw brake. It is adapted for fitting either on a forward or back action. [*A diploma awarded.*

Davidson's Self-Injecting Syringe.

C. H. Davidson & Co., Charlestown, Mass.



Patented March 31, 1857.

The bulb a, and the tubes b and c, are made of vulcanized rubber, and all the other parts of block tin. The valve boxes, d and e, fixed in each end of the bulb, contain valves which open inward and outward, or to and from the bulb respectively. The suction pipe, c, is attached to the box, d, and its other extremity is terminated by the end piece, f. The delivery pipe, b, is attached to the box, e, and is terminated at its other extremity, so that either the anal pipe, g, or the vaginal pipe, h, may be used.

By introducing the extremity f of the suction pipe into the enema, and by the alternate compression and expansion of the bulb, a, any required amount may be administered without removing the instrument, which possesses the further advantages of durability, portability, facilities for cleansing, and adaptation to every use of an injecting syringe. The ease with which this instrument can be managed, in any position of the body, by an invalid, and its adaptation to those cases in which the injection requires, for its efficient action, a level or an elevated position of the pelvis, will, it is believed, recommend it to favorable notice.

To those cases where patients cannot be moved without causing them great pain, this instrument is peculiarly adapted, as its flexibility and construction allows it to be used in any position of the patient, instrument or vessel containing the enema. The strains or wrenching, which cannot be avoided even by the most careful operator when a rigid syringe is used, with the pain occasioned thereby to the patient, are by the use of this instrument avoided.

The operation of this instrument is as follows: Immerse the end of the eduction tube in the enema, compress the bulb with the hand, which will expel the air from within, then releasing the grasp, the bulb will recover its form by virtue of its elasticity, and the partial vacuum thus formed will be filled by the enema. Now insert the injection tube, and repeat the operation of compressing the bulb until the required quantity of the enema is administered. We prefer the spheroidal shape for the bulb, as with that shape a better effect is obtained from the grasp of the hand than with any other. The prolate spheroidal form of sac, is the one best adapted to produce the greatest effect from the grasp of the hand, by which this instrument is operated, by so combining it with the tube and valve boxes that they shall be in or nearly in the greatest axial line of the sac, the fluid is passed through the instrument in the most direct manner, and with the least loss of effect possible by friction. [*A diploma awarded.*

Lyman's Dry Refrigerator.

A. S. Lyman, 212 Second avenue, New-York.

The ice is placed in the chamber A, and the air in contact with it being cooled and condensed, and therefore rendered heavier, flows down through the grate R, and the descending cold air flue C, in the direction of the arrows. It is discharged up through the opening in the back part of the bottom of the lower drawer. The warmer air in this drawer rises up through the opening M, in the division board above and onwards, finally passing up the flue D, and over again upon the ice. Thus a current is formed, as shown by the arrows.

For the purpose of showing more clearly its internal arrangement, the middle drawer is represented as partially open. This shows the opening M, through the division board, on which that

drawer rests; and the opening N, through the back end of the bottom of that drawer. This opening N is now closed by the division board. When the drawer is closed, these openings M and N coincide, and the air flows freely through them, as it is forced from the lower to the upper drawers by the superior weight of the column of cold air in the flue C. The back end of the drawer cuts off all connection with the refrigerator, so that no air can flow out when it is open. The cold air in this drawer being heavier than the air outside, remains in it, unless there are currents in the room, which at most can only sweep the air from this drawer.

Some of ths gases set free in refrigerators, are absorbed bv ice, or rather by the pure water as it is dissolved from ice. But that alone will not absorb all impurities, nor prevent a refrigerator from accumulating bad odors, as is known practically by all who have used refrigerators for a sufficient time.

In order that the air may be rendered perfectly pure, the charcoal filter, S, is placed in the back part of the drawer, so that the air in its rounds is constantly being filtered through the charcoal, and thus deprived of all its impurities. The water from the melting ice runs into the gutter G, and off by a trap pipe not shown.

These refrigerators are all made double, as represented, and the spaces, which are from one and a half to three inches wide, filled with pulverized charcoal; this increases the weight and cost somewhat, but it is essential to practical success.

This refrigerator is opened at the side, without allowing the cold air to flow out.

In all our experiments, the air has not only been dried as thoroughly as it can be by any arrangement with ice, and deprived of some of its impurities by the water at all times flowing over the surfaces of the ice, but it is thoroughly and perfectly disinfected by the filter of charcoal through which it passes at every revolution. In this particular form the charcoal filter, in effect, divides the bureau into two separate refrigerators, and the articles in one can never smell or taste of those in the other.

[*A large silver medal awarded.*

Winship's Improved Self-Ventilating Refrigerator.

Charles Winship, New Haven, Conn.; Bramhall, Hedge & Co., agents, 398 Broadway, New-York.

The peculiarity of this refrigerator is, that while articles can be kept within perfectly sweet and fresh for an indefinite period; that while the refrigerator may contain twenty different articles of food, of different flavors, that the air which flows through the refrigerator keeps each flavor separate, carrying off all emanations of every description. This has been tested many times, with the invariable result that odors and flavors are absolutely incommunicable within the refrigerator.

ADVANTAGES CLAIMED.

1. A perfectly uniform temperature, so that every portion of the refrigerator can be used at the same time.

2. A constant change of air is secured in the provision chamber, without any unnecessary waste of ice, or loss of the air already cooled.

3. A downward current of cold air prevents the provision chamber from being filled with warm air on opening the door, as is the case with refrigerators of other patterns.

4. The cold air performs the double office of cooling the chamber and purifying it from offensive odors, and also of protecting it from the warm external air.

5. The great convenience of the ice chamber, access being had to it without disturbing the provision chamber.

6. The form of the provision chamber, by which every portion of it can be used with equal convenience.

7. Meats, fish, and articles of a strong and unpleasant odor, can be placed in the lower portions of the chamber, and in consequence of the downward current of air, the effluvia cannot come in contact with more delicate articles, if they are placed on the shelves above.

AA. Ice chamber.

B. Provision chamber.

CC. Registers, through which the air is admitted into the ice chamber.

DD. Apertures, through which the cold air passes into the provision chamber.

EE. Apertures, through which the air passes into the space between the cases of the refrigerator.

FF. Registers, through which the air passes off.

I.—By opening registers CC, air is admitted into the ice chamber A, where it is cooled and purified in the most expeditious manner.

II.—The air thus cooled and purified passes through apertures DD, (the natural tendency of cold air being downwards,) directly into the provision chamber B, permeating every part, and preserving a uniform temperature throughout the entire chamber.

III.—After the cold air has thus performed its office, it is made to pass through apertures EE, where a slight warmth will cause it to pass up through the space between the cases of the refrigerator, and out at registers FF, thus serving the further purpose of preventing the warm external air from penetrating through the cases into the provision chamber. [*A bronze medal awarded.*

American Porcelain.

Union Porcelain Co., 82 John street, New-York; works at Green Point, Long Island.

This company is the largest Porcelain company in the United States, with a cash capital of $150,000, owning large real estate, and employing some 100 to 150 workmen in making pure American china from our own native soil—everything connected with its manufacture is purely American. The porcelain clay, or kaolin is found in New Jersey and Pennsylvania. The feldspar in Delaware and Connecticut, and all the other materials in our immediate neighborhood.

The articles made by them are every variety and kind of knobs used for doors and drawers, escutcheons, cloak and hat hooks, and all articles used in house trimmings; cups and saucers, bowls, plates, pitchers, of endless variety ; spittoons, plumbers' basins,

47 JOHN STREET,

lley,
Treas

which are acknowledged by all to be far superior to any French china imported.

The company are but in their infancy; and it is just becoming known that American china can now be had at home, equal to any in the world.

This company claim superiority over French china, by its extreme whiteness, purity, strength and durability, and of great length of service and retention of its color to the end.

[*A diploma awarded.*

Improved Marquetry for Ornamental Flooring.

Groebl & Volkmar, Baltimore, Md.

The several pieces of wood of which this ornamental surface is composed, are not simply placed in juxtaposition at their edges, as in all marquetry hitherto, but interlock, and are reciprocally supported, by means of tongues and grooves cut around the entire perimeter of each piece. This is the method of fastening employed, and it possesses these signal and valuable advantages:

1. It obviates the necessity of using nails, gums or glues, which have been, heretofore, considered indispensable in order to secure the various pieces firmly to the surface upon which they were laid.

2. It effectually counteracts the tendency to warp, which is very great when different kinds of wood are used. Each piece is firmly held, as may be readily ascertained upon inspection, by from three to eight others, so as to be utterly immovable from its position relatively to the rest, without a general detaching of the pieces. Experiment cannot, certainly, be needed to test this point, since the theoretical consideration suggested is, in itself, so strong as to have nearly the finality of a mathematical demonstration.

3. By this process of fastening, the pieces are not necessarily secured permanently to the surface, which they overlie, but may be laid down temporarily, and afterwards removed with almost as much facility as a common carpet. Thus, this flooring need not become a fixture of the house in which it is put down, which would, of course, be the case if it were secured by nails, but may,

upon a change of residence, be transferred to another house with as much propriety as any article of furniture.

This method of fastening, Messrs. Groebl & Volkmar, present as their peculiar improvement upon the European marquetry, and upon all tonguing and grooving hitherto employed in flooring of every description. The process, whether accomplished with or without machinery, is what they have patented, and that, too, for all purposes to which tonguing and grooving around an entire perimeter may be applied. They, in fact, perform the process by a machine, which, as being merely *instrumental* in the process, does not require to be patented, and which, as only and intermediary thing, they do not place on exhibition here—wishing to show the results arrived at rather than the means subsidiary to them.

Again, they would respectfully submit that the present application of the process, as well as the process itself, is highly meritorious. There can surely be nothing more chaste and tasteful than the ornamental wooden flooring so extensively used, and so much admired abroad, in its fidelity to those correct principles which constitute the ethics of genuine art, in its truthfulness to nature, in its simple and unpretentious elegance, and in the almost indefinite diversification of ornament attainable by variations in the figures and colors of the pieces of wood employed; it is not invidious to say that it should be preferred, in many cases, to marble, encaustic tiles, oil-cloths and carpets. Nothing can be better adapted to halls, libraries, parlors, cabinets, club rooms, the aisles of churches, staircases, and the offices and studios of professional and literary men, than this improved marquetry, in the several varieties, differing in expense as well as style, which can be supplied. The method of manufacture employed by Messrs. Groebl & Volkmar, greatly diminishes the usual cost of such a flooring.

[*A bronze medal awarded.*

Solidified Milk.

R. C. Hepburn, Dutchess county, N.Y.; R. Allstrum & Co., agents, 23 South street, New-York.

This article is manufactured in Dutchess county, New-York; the factory now in operation being capable of producing 1,000 lbs. of the dry milk per day.

The importance in a sanitary point of view of having pure fresh milk on sea voyages, in armies, &c., where other fresh provisions cannot be obtained, and of absolutely pure milk in cities, for children, invalids, and others, has been sufficient to stimulate with the scientific and ingenious, continued investigation and experiment, for its preservation, unchanged in character and quality. This desideratum had been unsuccessfully supplied, until the present process of solidification, or chrystallization resulted in a perfectly successful accomplishment.

An ordinary specimen of the "dry milk" has been deposited here; several thousand pounds of a precisely similar quality may be seen at 23 South street, or any of the stores.

This article is made by applying a low degree of heat to new milk before the separation of the cream, in such a way as to produce an exceedingly rapid evaporation of the watery portion, leaving the solid (that is the casein) and oleaginous constituents entirely unchanged. No better proof of this is needed than the fact that good butter, cheese and ice cream, can be made from it equally as well as from milk fresh drawn from the cow, even if it has been in a solid state for years.

The chief characteristics and advantages of this article, and which belong to it alone, may be briefly cited as follows, viz:

1. Entire purity! There being nothing used in its manufacture except fresh milk, and a small quantity of the best refined white sugar. (For children, invalids, cooking, &c., see report of the New-York Academy of Medicine; also certificate of Dr. Doremus.

2. It will keep longer than most articles of food, whether at sea or on shore. (See statements of Dr. E. K. Kane, Capt. Mumford, Col. Eaton and other seamen, soldiers, travelers and missionaries.

3. More nutriment for the human system is contained in a given quantity than in any other kind of food, which is a consideration of great consequence to soldiers, persons crossing the plains, and others in like circumstances.

4. It is cheap enough to be within the means of all persons, and although it is not supposed that it can ever supply the place of pure milk in the liquid condition; still the difference is but slight, when the presence of the sugar is considered.

The preparations of milk that have heretofore and now are made, have all (with the exception of the article under notice,) been subject to one radical defect, viz: That they will not keep sweet a single day, unless hermetically sealed from the air, a condition difficult and expensive to obtain, and inconvenient, inasmuch as when the can is opened it must be used immediately, otherwise it will spoil as quick or quicker than ordinary milk. Even Gale Borden, the veteran preserver of beef, after long experiment, has only been able to produce a pasty substance in which the work of decomposition commences the moment the air reaches it; whereas the "dry solidified milk" will keep perfectly sweet for any length of time, in any climate, and under any circumstances where refined sugar will keep.

[*A bronze medal awarded.*

REPORT OF THE COMMITTEE ON MANUFACTURES, SCIENCE AND ARTS, OF THE AMERICAN INSTITUTE.

Report on Sherwood's Self-Acting Feeding Apparatus, to be used upon Machines for making Cut-Nails.

First. That the apparatus exhibited was invented by Mr. J. P. Sherwood, of Fort Edward, in Washington county, N. Y., and is the first and only specimen of it which has yet been made.

Second. It is applied to a machine originally built to be fed by hand, and of a form which is in common use in nail manufactories. One of the characteristics of the apparatus being, that it is applicable to any kind of nail machine, without changing its form or mode of operation; simply taking the place of the man or boy hitherto required to perform the same work in a less perfect manner.

Third. It is claimed, that with this apparatus attached, the machines may be worked faster than they can be when fed by hand, and the quantity of nails made by each machine increased in the proportion of nine to seven.

Fourth. It is also claimed, that with this apparatus attached, one person can attend several machines, instead of being confined to a single one, as is the case in the present practice of hand feed-

SHERWOOD'S SELF-ACTING FEEDER, FOR NAIL MACHINES.

ing, and a large proportion of the cost of attending the machinery be thereby saved.

Fifth. It appears to be easily adjusted to produce nails of any desired form or proportions.

The above are the principal advantages claimed for the apparatus, as exhibited, and the committee see no reason to doubt that they may be realized in practice; though, before giving it an unqualified recommendation, they would prefer to have the evidence which would be afforded by a more extensive trial in a regular manufactory.

Very respectfully submitted,

JOHN D. WARD,
THOMAS B. STILLMAN,
JOSEPH DIXON,
MENDES COHEN,
S. D. TILLMAN.

Committee.

Description of the above Machine.

A is the frame, which is of great strength, and mounted on four rollers, so that it can be moved from place to place, or to different positions in the workshop; B is the driving belt, communicating power from the main shaft to the band and fly-wheel C; D is an ordinary nail machine, having on its shaft an eccentric, grooved, which receives a pin or roller projecting at right angles from a bar, G, and by the motion of this pin in the eccentric, it causes the bar to move up and down while the pin slides in the guides, F. The bar, G, is connected by a screw with the piece, H, which is free to move in guides on the plate, I, that can be adjusted to any position on the table, J, screwed or otherwise attached at any suitable angle to the standards, K, which rise from the frame of the nail machine, A, at suitable distance from the dies. To H, two bars, O, are attached, bearing or holding at their extremity a hollow guard, P, through which the iron to be cut projects. This piece of plate iron is seen at R, held by the pincers or teeth, Q, which are attached to a rod that is rigidly connected with the cam, L, in H, and also connected with the screw, M.

The operation and working of the machine is as follows:—When the dies are put in motion by means of the belt, B, the eccentric, E, is also rotated, and so moves the bar, G, and frame, H. The motion of this up and down, causes the cam, L, to revolve, by means, of a fixed pin, and its own inclined slot, half a turn, so as to present the opposite face of the metal, R, to the dies, so that all that can shall be cut into nails, and no metal lost. When the handle, N, is up, this is all the motion that takes place, but when it is down upon the feed screw, M, this up and down motion also gives the screw a turn which feeds the plate, R, just the length of one nail under the dies. The operation which this feeder performs are, first, the turning of the plate accurately during the raising of the die, so that no time is lost, and it also feeds the plate at the same time to the dies exactly the proper amount, this, of course, being regulated by the pitch of the screw, and the eccentric is so placed on the shaft that the plate and feeder are quite rigid during the process of cutting. It is a most valuable improvement in nail machinery, and will save much time and labor.

PROCEEDINGS OF THE FARMERS' CLUB.

[ORGANIZED JUNE 22, 1843.]

The Farmers' Club of the American Institute is under the direction and control of the committee of agriculture.

The meetings are held on the first and third Tuesdays of each month, at 12 o'clock M., except the months of March, April and May, when they are held weekly, at the rooms of the Institute, No. 351 Broadway.

The meetings are free to the members of the Institute, and all other persons connected with the pursuit of agriculture, or who may desire through this medium to diffuse information on the subject of cultivation.

The Club will be happy to receive written communications at its meetings on the subject of agriculture, horticulture, the raising and improvement of stock, and chemistry applied to agriculture.

May 5th, 1857.

Present—Messrs. Nicoll of Shelter Island, Francis Robinson, Pardee, Solon Robinson, Martin E. Thompson, John C. Montgomery, Dr. Waterbury, Messrs. Darling and Stacey, Prof. Hildreth, Messrs. Hathaway and Leonard, Prof. Nash of Vermont, Mr. Geo. C. Barney, Prof. James J. Mapes, Mr. Lawton of New Rochelle, Messrs. John W. Chambers, Vail, Wagener, Judge R. S. Livingston and Mr. Livingston, and others, nearly forty members in all.

President, Robert L. Pell, in the chair. Henry Meigs, Sec'y.

The Secretary read the following translations, made by him, from the works received by the Institute since the last meeting, viz:

TREES IN IRELAND.

By the return made to Parliament recently, by Mr. H. Hughes, it appears that there have been registered with the clerks of the peace, during the last ten years, 2,678,856 trees.

[Bulletin Mensuel De La Societe Zoologique D'Acclimation, No. 3, March, 1857.]

From this work, which like many other valuable ones laid upon our table by France, free of charge, as is also the case with the works from the Emperor of Austria, Emperor of Russia, and the Kingdom of England, we make the following extracts:

INTRODUCTION OF THE CAMEL INTO BRAZIL.

Report of the Committee, by Mons. Dareste, the Chairman.

Translated by H. Meigs.

The Brazilian government has recently determined to try the dromedary in many of its provinces. The experiment has every chance of success. It is known that there are two species of camels—that with two bunches on its back and that with one, or as Aristotle described them 2,200 years ago: The Bactrian camel with two humps on his back, and the Arabian camel with one. The first race occupies the centre of Asia, between the sea of Aral, Siberia, Thibet and China; and the other Persia, Syria, Arabia, Egypt, Northern Africa and Senegal. When carefully examined, we find that notwithstanding the topographical and climate difference of the countries inhabited by these two species, that notwithstanding the great difference of latitude, and consequently of temperature, these countries, in certain respects, present a remarkable uniformity.

The dromedary goes three days without eating and three months without drinking, without appearing to suffer from such abstinence. It has in its stomach a reservoir of water, pure, and perhaps the creature produces it. No traveller dares to say that the dromedary ever drinks a drop for the two last months in autumn, during winter, or during all the spring. However extraordinary this seems it is true. Daubenton thought that the reservoirs were to keep the water drank; Cuvier thought that the reservoir secreted water. At the commencement of summer, the dromedary drinks, then waits fifteen days, then thirteen, then twelve, and finally seven days interval—this is the shortest between drinks, whatever be the fatigue of the journey or the heat of the weather.

Notes.—Daubenton examined these reservoirs or water last century, but did not properly describe them. Cuvier thought that they had the power of secreting water. General Carbuccia has

given us very interesting details. The reservoir resembles a melon in all its texture—contains more than fifteen quarts of water, of a greenish hue, but without any bad taste. The Arabs said that if suffered to stand still for three days, this water would become limpid and good to drink. The experiment was tried and was successful. It is desirable that a chemical analysis of it should be made.

The vegetables which principally feed the camel are shrubs, dry and prickly, and those salt plants which grow on the desert, chiefly thistles, *Tamarix*, a shrub with rod-like branches, bark somewhat bitter, and small thorny acacias.

The camel eats the stones of the dates, which are as hard as wood. It so happens that the dates and the one hump camel occupy about the same regions The feet of the camel enable him to travel well on sand, on rocky-ground, mountains; but are bad for wet clay—he slips and is in danger of falling and breaking his legs.

Some of the races of Persia and of Egypt, carry a load on the back, of some 700 lbs. weight, and a common load for one of them is 400 to 500 lbs. For carrying far and readily he excels the elephant as well as the horse. The camel will henceforth play a great part in our history. They have been employed to carry small field pieces, suited for that purpose.

In Algeria the dromedary is called *Mehari*, and in Arabia *Delul*, in Turkey *Ieldevesi*, in Persia *Schutturba* or *Rehawich*, in Egypt *Heguin*. He is mentioned by Diodorus Siculus as the most slim and swift and indefatigable—his name on that account is Racer or Courser, from the Greek word for Course, *Dromos*—δρομος, whence Hippodrome or Horse-course.*

DIOSCOREA OF NEW ZEALAND.

The experiments with it in France, are not very encouraging, although faithfully tried by Messrs. Moquin, Tandon, Paillet and Chatin, to whom they were given for experiment by the Royal Agricultural Society of Turin, last year. Violet Ignames, of Mauritius, also.

* Mehemet Ali has ridden without stopping, in eight hours, a dromedary nearly 400 miles—this was a creature particularly educated to run. (180 *kilometres*.)

Dr. Sicard presented samples of products obtained by him from Sorgho Sucre—an album of 90 colors from the seed covers, and straw and paper from the stalks.

Mr. Paul Latourette, of Angouleme, has kept wild ducks and their progeny for a dozen years, without finding any alteration of their original character.

Consul Montigny has sent home some enormous tubers of fine feculent quality, from the forests of Siam and Laos; and also a catalogue of twelve species of Dioscorea, (Yams) with descriptions of them and the methods of growing them.

Mr. Daelen of Roldue, near Aix-la-Chapelle, announces a present to this Society of a peculiar race of pigeons, called Clayner, (Clappers.)

Doctor Sicard states that the young growth of Sorgho Sucre is excellent forage—that sugar is made of the ripe plant, and flour of very good quality from its grain—that the plant suffers near Toulon from the mistral, (the north-west wind.)

The Secretary read the following note from Madam D. N. Saunders, of Leesburg, Virginia, dated April 24, 1857:

"Will any gentleman of the 'New-York Farmers' Club,' have the kindness to bestow on a Virginian lady, half a dozen seeds of the 'Imphee' or sugar plant, brought to this country by Mr. Leonard Wray, of Natal, South Africa. Any of the varieties would be thankfully received, but those for the north would suit our altered climate best.

"Our wise State government has made our taxes so heavy that our ladies will have to make their own sugar for the future.

"In the hope to benefit my neighbors, I make this, perhaps, unprecedented request. If my application should be successful, please enclose the seeds in the accompanying envelope.

With much respect,

D. N. SAUNDERS.

Mr. Ayres of Hartford, Connecticut, placed on the table a model of a self-acting bucket, &c., by which stock—one at a time—can raise water enough for its own drinking by means of its weight upon a platform next to the well. Large numbers of cattle or

horses can thus help themselves. A great saving of labor. The well will be at the lowest part of fields, therefore not very deep.

Mr. Ayres also has on the table a model farm gate, much admired. The wheels of a vehicle pass over slight elevated parts, which spread the double gate wide open, and on passing out the wheels touch like elevated parts and close to immediately.

The American Guano Company requested the appointment of a special committee to examine the new guano from the United Islands of the Pacific ocean, now arrived at Benson's office, corner of Old slip and South street. Mr. Benson believes that the islands contain ten millions of tons of guano. The islands are in possession of them. The company will sell the guano for much less than the prices of other guano—that is for forty dollars a ton.

The President appointed the following committee, viz:

Professor Nash of Vermont, Mr. Pardee and Dr. Waterbury of New-York.

WYANDOT CORN.

The Hon. Harris Scoville, presented two ears of this new and singular corn, grown by Mr. N. P. Howell of Sag Harbor, Long Island, in 1856. From three seeds, each of which produced several stalks, he obtained eighteen ears, the best of them about a foot long, eight rowed, grain very white; is later in ripening than our white flint corn; one grain in each hill, and the hills four feet apart.

The subject of ventilation introduced the question of pure air.

Prof. Hildreth considered that when, (as does often happen,) finely decomposed animal matter floating in air, is inspired, the system is very liable to suffer from the effects of putrefactive condition. The hotel miasm of Washington, has affected, as is said, some 700 persons, of whom twenty-five are dead. Experiments ought to be fully tried there, and yet there is risk of life to those who shall experiment there.

Solon Robinson—So far as vitiated air can give disease, our city has as many killed as most places from like causes. Some of our places are almost as bad as the black hole of Calcutta.

Prof. Hildreth—Decomposed vegetable matter has not such fatal influence as the animal, on our health.

Prof. Nash of Vermont—All organic matter dissolved in air is more or less hazardous to man. We know that a room covered with colored paper hanging, green paint, which nearly killed the tenant before he discovered what the cause was. Prof. Johnson ascribes to some undiscovered poisonous material in the air, many dangerous effects to health.

Prof. Hildreth—Yes; arsenic volatilized is to be found in the city atmosphere; gases, volatile ammonia, &c. And it is known that one effect of decomposed animal matter, taken into the human lungs, tends to injury to the blood.

Prof. Nash—It may be asked, how much life is destroyed, too, by carbonic acid gas, in such repeated though small doses as are often found in city air?

Prof. Hildreth—These causes operate so as to render life shorter by at least ten years. We should mention among the impurities of air, sulphurated hydrogen gas. The carbonic oxide escapes from our sewers, and enters air.

Prof. Mapes spoke with his wonted ability, scientifically on this question; but we prefer his own words to our cwn, and he is too busy to write them for us.

Solon Robinson—How high should a bed be above the floor, to have the best air a room admits?

Prof. Mapes—Reasonable height. Certainly not on or near the floor, nor the ceiling. The air of the mountain is good for us. The Mexicans, occupying a land some six thousand feet higher above the sea than New-York, are remarkable for having large chests, (thorax,) like birds; there is no *consumption* there! The fish bladder there is larger than nearer the ocean level. He adverted to the fever and ague here, saying, that when he was young, it prevailed just above Leonard street.

Prof. Hildreth—Boston disposes of her city garbage and filth far more cleverly than we do here. The collections are all taken from the rears of buildings, punctually. Americans generally have too flat chests. Other nations have larger. Consumption demands more study than it has ever received. I consider it to

be a scrofula on the lungs. It is possible, by scientific regulations, to prevent air being loaded with decomposed animal and vegetable matter. The whole question of ventilation concerns it. Among other matters, we have found that much depends on the form of chimneys, for carrying up and off bad air. The flue of every chimney must converge from the bottom to the top, to enable this to be done. Pedet is right on this point.

Dr. Waterbury—This is a great hygienic question, and we have no knowledge of what is called mal-arid (bad air). All excretions are, in a degree, poisonous to the animal and the vegetable making them. When we reflect on the subject of organic chemistry, and take Liebig's strong points on that matter, we perceive an impending revolution in medicine, as well as agriculture. It is not apparent that the air of mountains is favorable to sufferers with consumption, for the Green mountains of Vermont are well known to have more consumptive inhabitants than their vallies, or the western prairies.

Mr. Alanson Nash, of New-York, read the following paper on

THE WREN AND OTHER INSECT DESTROYERS:

In the year 1854, I lived at No. 128 Second street; the house was one in a block situated on the north side of the street, with the rear enclosed by yards adjoining an open space or a garden. In the yards of these houses were grape vines, cherry trees, apricot and peach trees, shade trees and shrubbery; some years prior to 1854, in the spring, for places for nests, I obtained a carpenter, on the last of April, and got up a house for the birds on a staff, thirty-five feet high, running up through the branches of a peach tree, on which entwined a grape vine. The house was built in the form of an oblong, with a roof and piazza; at one end, an open window led into this house from the piazza, nearly to the ridge of the roof; under it a two-inch augur hole was made, in each end of the house, to ventilate it. In other respects the house was light, and kept out the rain and wet at all times; the wren house, thus erected, overlooked much of the surrounding garden and the yards.

This staff was put up late in the evening, say about the 28th of April, 1854; the next morning, before sunrise, a cockerel wren

had perched on the house and begun his songs; soon after his mate made her appearance, and the twain commenced their recognizance of their intended dwelling; they walked over it, flew about it, went inside, came out, passed through the air holes, and never did man and wife go a house-hunting with half the assiduity and care that pair of birds did; they inspected, then passed to and fro, and around and over and through their dwelling a half dozen times at least, then, after a consultation for a few minutes, I saw the cockerel fly down into the yard near the house, seize a bunch of weeds, broke twigs off, flew directly up on to the platform with twigs in his beak; here an unexpected difficulty occurred, the twigs were five times longer than the width of the door where he entered into his house, but he overcame it; he slid his beak along the bunch to near the end, then he dragged his twigs into the house end ways; this was the first beam laid for his nest. In the course of the day he must have carried up into the house hundreds of twigs.

The she wren was seen conveying feathers and hair into her house to complete the nest.

These birds staid about their house until the last of August, say about eighty days.

The first brood of young ones came off in twenty to twenty-eight days, they were five in number; the second brood came off in June, three in number; and the third brood came off in August, two in number; making ten young ones hatched and reared by the two old ones in one season. All day long the cockerel would sit on the house and sing, and alternately carry up worms, crickets, flies, moths and worms and seeds into the house for his partner, while sitting and hatching the eggs, and to feed the young birds.

Never did Napoleon ride prouder before his armies, than the old cockerel did when the broods of young ones came off; he saw them safely landed in a thicket, on a cherry tree, every night, until they became able to fly and take care of themselves, which they did in less than ten days. I can say that many baskets of bugs, worms, moths, and food of this kind, were carried up into the nest during the three hatchings of the young wrens.

These were complete scavengers for all the yards and gardens in the vicinity. They seemed to have cleared out all the vermin

wherever they assumed their jurisdiction. The work was done thoroughly when the birds did it.

Wrens are an agreeable family of songsters working about a dwelling; and who would be so cruel as to kill or annoy them.

In the United States are probably four millions of families, who for a trifle could erect houses for birds on their premises and in their gardens. If done, how many millions of baskets of vermin would be destroyed; the caterpillar and canker-worm would disappear in a few years.

At Union square, in the city of New-York, two hundred wren houses were put up last year; many of those houses were occupied not only by the wrens, but other birds, such as the ground thrush, yellow birds, phepe birds; and robins made their appearance in this park and did much to divest the trees and shrubs of vermin. This was in the heart of a great city. My brother, who lives in Hampshire county, Massachusetts, has within five years set out the mountain larch tree, or evergreen, around his house; the robin red breasts soon appeared, and no less than five families occupied the grove last year, with their young. His grape vines and fruit trees were soon benefited by this congregation of songsters.

As soon as the wren birds had taken possession of their new habitation at No. 12 Second street, and become tenants for the season, divers other families of wrens appeared and claimed to occupy the habitation, but the first family claimed the house as their castle, and, by dint of skirmishing and defence three or four days, the assailants were compelled to raize the seige, and departed for other homes. I procured, at the Washington market, a male bobo'link bird, and set his cage in the peach tree, under the wren house. Soon after the wren birds had been established in their summer home, the bobolink began his warbles and strains, and all day long the bobolink would utter his songs, and every strain was responded to by the cockerel wren, during the summer, until August, when the moulting season commenced. In a week the bobolink was silent; his music had departed for other spheres; his white feathers were shed in a few days, so that not one remained. The color of the bird now became brown, and afterwards almost black, and so continued until the month of February following, when the white feathers began to appear again about

the wings and head. But poor bobolink! he died with grief before May day came.

Subjects for next meeting, "The most profitable crop for a farm, locality considered;" and "the most profitable succession of crops."

Adjourned to May 12th, at noon. H. MEIGS, *Secretary.*

May 12th, 1857.

Present—Messrs. Low, Lawton, Martin E. Thompson, Meeks, Judge Scoville, Prof. Mapes, Godwin, Montgomery, Doughty, of Jersey, Fields, of Baltimore, Olcott, Rev. Mr. Corwin, of Sacramento, and others. Forty-three members.

William Lawton of New-Rochelle, in the chair. Henry Meigs, secretary.

The secretary read the following papers prepared and extracted by him, viz:

THE GRAPE OF CALIFORNIA.

It is cheering to know that bread and wine, far more precious than all the gold, are becoming magnificent crops in our gold country. In 1856, in ten counties, thirteen millions of pounds of rich grapes were produced. The town of Los Angelos, alone, made one hundred fifty thousand gallons of wine and six thousand gallons of brandy; and wheat is almost ahead of the reapers and millers.

The glory of our Pacific shores will be vegetable wealth! for there is none like it in that.

HOW TO MAKE CUTTINGS GROW.

Prof. De Lacroix Besançon, France, says: That cuttings of roses, apple, apricot, pear, plum and others, if put out in June, after his method, will grow. He takes a cutting long enough to let its two ends be well bedded in the soil, and a bud in the middle close to the ground, grows well. These cuttings should be kept properly moistened by sprinkling; the cuttings must be of the growth of the last year, the cuttings thus draw nutrition from both ends, instead of drying up the end in the air.

Mr. Pell made the following remarks on CITY DRAINAGE:

All offensive smells from the decomposition of animal and vegetable matter in our city, indicate the generation and presence

of the causes of insalubrity and of preventible disease, at the same time that they prove defective local administration. And collaterally, that, in rural districts all continuous smells from vegetable decomposition indicate preventible loss of fertilizing matter, loss of money and bad husbandry.

Of the first of these two conclusions any one may convince himself who will take the trouble to visit those portions of New-York city afflicted with small pox, typhus and scarlet fever, and any other endemic disease of a contagious nature; that his own sensations will immediately indicate the seats of insalubrity; he will feel a sickening, deadening depressing sensation caused by breathing the air mixed with organic vapors arising from decay, as well as offensive and pungent odors ; and though those odors invariably indicate danger, it does not by any means follow that danger does not exist when there are no such warnings ; as the danger is frequently greater when no warnings exist, from foul air, which does not affect the olfactory organs so strongly.

In the absence of hydraulic or steam works, for the drainage of our down town city houses, various palliatives of the evils connected with the retention of refuse beneath or near dwellings, have been tried, but invariably proved unsatisfactory.

The discharge of vegetable or animal excretia from houses through drains into sewers, as practised in the upper parts of the city, is most certainly wrong, from the fact that they are immediately carried into the North or East rivers, converting those splendid streams into common receiving sewers. This is not all; the outlets of the sewers into the river are, or soon will be, so low that their contents will be delivered at, or perhaps a little above, low water level. These decomposing, filthy matters are consequently delivered near the banks of the rivers, and left there to stagnate and poison the atmosphere, and to be brought up by every tide for the thorough pollution of the waters. In too many of these sewers the tide ebbs and flows, the immediate consequence of which naturally is, that the proper discharge of the sewerage is suspended, and the gases engendered by the decomposing mass within the sewers are driven back towards the point from which they issued; this renders it necessary to cleanse them by hand, as we have often observed foul sewerage matters being raised to the

stone curbs, to be conveyed away by carts, and again thrown into the river, with the same obstinate attempt to pollute its waters with a constant accumulation of solidified refuse. Who, knowing these facts, can possibly relish those delicious luxuries, fish, that constantly feed and grow fat upon such matters.

Now let us banish the idea of turning the North and East rivers into common sewers, and consider how the sewerage can be best arranged, by making use of the present sewers, by intercepting their contents before they reach the rivers, and form receptacles in which to collect them. By so doing we accomplish two objects; the public health and economy, being kept in view, it becomes our duty to show that the sewerage can be collected, raised, dispersed and treated without the least detriment to the first of these important objects, at a cost that will be balanced at least by the advantage of applying sewerage as a manure or an enricher for irrigation.

It is well known to all thinking men, that the contents of sewers consist of human and animal excretia, earthy matters, carried down by the surface water from the streets, with a portion of decayed vegetable and animal substances, which, during putrefaction, disengage ammonia; and if this process takes place in the open air, it mingles with the atmosphere in the form of carbonate of ammonia, and leaves the sewerage in a less valuable condition.

This admirable substance may be fixed in very many ways, by the use of chloride of calcium, muriatic or sulphuric acid, and even superphosphate of lime, all of which are cheap articles of commerce. If you would try an experiment to test the fact, fill a basin with concentrated muriatic acid, and place it in the City Hall water-closet, and you will soon find it filled with crystals of muriate of ammonia. Chemistry thus comes to our aid, and teaches us the means by which nearly, if not quite all, the offensive properties of sewerage water may be easily suppressed, and the useful properties retained for agricultural purposes. There is, therefore, no reason why a receptacle at the foot of each of our sewers in which the sewerage may be collected, should be, in any one respect, more disgusting to the senses, or injurious to the health of our citizens, than a reservoir of pure spring water.

The next question to be asked is, whether the agricultural value of the sewerage will pay the expenses of collecting and applying it. I answer, unconditionally, that it will. The expenses will embrace the construction of receptacles at the river end of the present sewers, and they may all be connected, as was proposed by myself, at the Farmers' Club, a few days since, by proper pipes, with two large receiving reservoirs, one on the east and the other on the west side of the city, and from there be driven by steam machinery through mains, under the Harlem and Hudson River railroads, to the agricultural districts. The economy of transmitting such matters through mains, is well understood, and the cost has been estimated, by competent engineers, at five cents per ton for a distance of five miles, and to a height of two hundred feet. This includes interest on capital invested, and all current expenses.

The cheapness of lifting and removal on a large scale by steam power, renders the question of levels far less important than it has hitherto been considered. The expense of raising forty-five thousand gallons a hundred feet high, by a twenty-five horse power engine, is about eighteen pence. There appears to be some misconception in relation to the power of pumping, and apprehensions are sometimes expressed, that mixtures of common street compost would clog the pipes, and could not be pumped. This is a mistake; as I have seen in potteries, tolerably thick mud, usually called slip, which is composed of clay mixed with granite and powdered flint, say one and a half tons of water to a ton of solid matter, pumped and and distributed with great ease.

Mr. Low remarked on the peculiar quality requisite in drain tiles, that is, their porosity.

Prof. Mapes said, that he had tried a great variety of experiments to makes the tiles porous, such as mixing chopped straw with the clay, salt, &c., which would keep until burned or dissolved out. He uses drains of from two to four inches calibre, and finds that when laid deep, they drain a much greater space. At five feet deep, they need not be nearer together than about eighty feet. It is now a fixed truth, that thorough drainage, with deep tillage, saves largely in manures, the land requiring so much less in quantity.

The American Guano Company sent two barrels of the new guano, for distribution among members who undertake to try its value in their farms and gardens.

The Secretary read the following from the *Tribune:*

BAKER'S ISLAND GUANO.

Notwithstanding the report of Commander Mervine, that no guano exists upon the island discovered, or at least first landed upon by Capt. Baker, we have had satisfactory evidence to the contrary, and ocular demonstration, in the examination, on Saturday last, of a portion of a part ship-load now on the way here from that locality. Four tons of guano, put up by Mr. Arthur Benson on the island in iron-bound casks, and shipped by way of the Isthmus of Panama, was opened at the office of the American Guano Company in presence of some twenty merchants and a committee of the American Institute Farmers' Club, to whom a portion of the guano will be sent for experimenting upon various crops, which is the only true way to test its value.

There is no possible chance for dispute as to the genuineness of this guano, as now exhibited. It is a very heavy guano, but contains no sand, and is unusually rich in phosphates, in a form ready for immediate use by the plants. There must be a very considerable accumulation constantly going on of new guano, as Mr. Benson says the number of birds is almost beyond human belief. It is folly to attempt to go ashore with a good suit of clothes on, as the bird droppings fall in a continual shower, from the birds which fly overhead in flocks of countless numbers.

Baker's island is situated in lat. 0° 15′, and lon. 176° 21′, and is one mile and 3,855 feet long, 5,040 feet wide, with deep water enough for the largest ship to lie within 200 feet of the shore, and so little surf that the cargo was put on board by whale-boats, loaded to the gunwale, without the least trouble. In fact, the trouble to be apprehended is too much calm, while the water is too deep for good anchorage in a strong drifting tide. The area of the guano deposit is 114,000, superficial feet, with an average depth of four feet, and an average weight of at least 60 lbs. per cubic foot.

Jarvis island, which is some fifty miles from the other, is two miles and 3,336 feet long, and one mile and 1,108 feet wide in the center. The area of the guano deposit is 27,392,512 superficial feet, with an average depth of 2 feet 9 inches. The quantity is variously calculated at ten to fifteen millions of tons, all of which is secured to this company by act of Congress, upon condition that they sell it in place at $4 a ton, or alongside of vessel at $8 a ton, and to none but citizens of the United States. It can be freighted here for $20 a ton, and sold at at a fair profit for less than $40 a ton—perhaps for $30. This will be of immense benefit to all the owners of poor land, and, through increased production, to all the people of this country.

The four tons now here will be placed in the hands of disinterested parties within a few days, who will carefully test its value, which we shall endeavor to report faithfully.

Dr. Waterbury, from the special committee on this guano, remarked, that this guano, in position on the island, has a thin crust, occasioned by slight occasional rains or dews. The nitrogenous element in it is not derived from the atmosphere.

Prof. Mapes had no reason to doubt the high value of this guano. Ammonia is gathered by our earthen flower pots; after being some time in use they absorb it. Our experienced gardeners grind up their old pots and use them for their ammonia.

Dr. Waterbury said, that the present high prices of bread and meat called for our strongest approbation of the introduction of so powerful a fertilizer as this guano, and of all that science and industry, too, which can, in this great land of ours, prevent such a strange anomaly as too dear bread and meat! Let us then welcome with open arms this and every other honorable matter tending to bring down these anti-American prices—prices fit hardly for a worn down despotism! Prices disgraceful to this new and vast continent, able, if willing, to feed the whole human family.

Masa B. Southwick, of Canada, exhibited exsiccated potato in the form of small grains. By hot air, he reduces fifteen bushels of potatoes to one barrel; and also the mode of cookery. Water

is made to boil, then a suitable portion of the potato grain is thrown in, and in five minutes there is a dish of mashed potato ready for eating. The value of this potato grain is about ten cents a pound. It will keep as long as it is kept dry. The Club was pleased with it.

The same subject ordered continued, viz: "The most profitable crop for a farmer, locality considered;" and "the most profitable succession of crops."

Adjourned.

H. MEIGS, *Secretary.*

May 19, 1857.

Present—Messrs. Professor Nash, of Vermont, Adrian Bergen, of Long Island, Dr. Smith, Solon Robinson, Mr. Coates, of Philadelphia, Mr. Masa B. Southworth, of Canada, Mr. Starbuck, Mr. Stacey, Dr. Wellington, Mr. Doughty, of Jersey, Mr. Waterman, Wm. Lawton, of New Rochelle, Mr. Vail and others—nearly forty members, although a very severe north east gale, with torrents of rain prevailed all day, with occasional flakes of snow.

William Lawton was chosen chairman. Henry Meigs, Sec'y.

William B. Coates of Philadelphia, exhibited a fine model of his patent corn stalk cutter. The machine with one man and one horse, cuts down eight acres of corn stalks in one day. As it cuts, it gathers a reasonable number together for one bundle, drops them, and so repeats. The cutters are heavy and unlikely to fail, easily sharpened—said to be capital for cutting down sugar cane.

The members examined it and were pleased with it.

Mr. Secretary Leonard explained the action of the patent Car Coupler of Mr. Price, of Ohio. When a locomotive or a leading car run off the rails, the following cars are uncoupled from it instantly, but cannot possibly uncouple while upon the rails. The plan is simple and appears effective.

Mr. Waterman, who is well acquainted with railroad running stock, and is a civil engineer, objected to it, as not providing for the case of rear cars running off the rails, being switched off, and moreover, that it has been found necessary, besides the usual coup-

lings of cars, to connect them them with chains securely, to prevent accidents, from running off the rails.

Solon Robinson remarked that he had seen a contrivance for disconnecting cars when running off rails, by means of pieces of wood, which were sufficiently strong at tension, but break instantly when the cars are out of line by running off the rails.

Mr. Starbuck spoke of the new patent machine of Mr. Masa B. Southworth of Canada, showing that a machine costing twelve hundred dollars, converted 200 bushels of potatoes into a perfectly dry, granulated condition, capable of long keeping, if dry, and of forming a good dish like mashed potatoes, by boiling water, in five minutes. The whole of the potato, skin only excepted, is so converted ; so that as soon as they are dug they may be forthwith saved for public use, instead of awaiting the decay, latterly so soon incident to them even when dug up sound. As the driving out all the water by means of dry warm air leaves but a comparative bulk of about one in five—the nutrition of fifteen bushels of potatoes are reduced to one barrel. The cost of transportation, storage, rot, waste—being saved proportionally—200 bushels of potatoes are converted in ten hours.

Dr. Wellington—And the very usual loss from freezing.

Mr. Starbuck—The potatoes are carefully selected as sound and thoroughly well washed. A small piece of bad potato would injure much; hence the careful selection.

The same process was tried upon apples, and the result approved at the great Paris exhibition. It is in every way superior to apples dried in the common way. The skins must however be pared off before delivered to the machine.

The prepared potato keeps in any climate, while dry.

Mr. Waterman was pleased with this machine—thought it a very important one, both to farmer and consumer.

Mr. Starbuck thought this machine better adapted to dry corn and other grain, than the old way of kiln-drying.

Solon Robinson—The potato hates the light—therefore, if you would save him, you must keep dark! But Mr. Chairman, the abuse so universally showered on the poor potatoes, belongs to the cooks! Sir, where can you find, nowadays, a bright, mealy, fine

potato? And yet cooking will do it for the most of them. Your cook who cuts them, lays them in cold water, then puts them into the pot before it boils, would cut some other things! The potato should be well washed, put whole into boiling water, watched until done and then instantly drained of water and served up. We kill almost all our potatoes in pretending to cook them. (Cheers.)

Mr. Lawton has remarked the advantage of a dark cellar for them. He has one quite dark, the other some light. The potatoes from the dark one are remarkably the best. We must tell everybody to keep his potatoes perfectly dark.

Prof. Nash said that the temperature at which the potatoes are kept has much to do with their preservation, and in stowing them the more dirt the better. That farmer who digs his potatoes and lets them lie exposed for hours to a hot sun, does them great harm. The rule should be out of the dark ground into a dark cellar as soon as possible, and the sooner the better. I will take this occasion to say how hard it is to avoid routine. Mr. Stebbins never hilled up his corn, when every body else did, and had better crops than his neighbors, who all hilled—this was when I was a boy.

The Chairman—One barrel of flour supports one person a year; it would require several of potatoes to do that.

Dr. Smith gave an exact account of the Lancashire mode of cooking potatoes—from which it seems that the art consists in putting into boiling water and carefully watching them until done, and serving them up as soon as possible, and they are mealy and bright.

Mr. Starbuck, in reply to a question, said that this Southworth machine would prepare pumpkin, squash, &c., in similar style to the potato. One machine in an ordinary sized town would do all the work required for farmer, and for merchant.

Prof. Nash—Considering the great amount of work this machine can do, and the value of it, it is not dear. Millions of dollars a year can be saved by it. In preserving the potatoes great care is requisite in keeping all bad parts out, for a small portion will injure a considerable mass.

Mr. Lawton—Potatoes are now so dear as to be almost beyond the reach of our poorest people. I call up the regular subject of the day, viz: "The most profitable crop for the farmer, locality considered;" and "The best succession of crops."

Solon Robinson—For the purpose of opening a discussion upon this question, I lay down this proposition. No farmer in the vicinity of this city can afford to use his land for anything excepting one of these purposes: For raising market garden crops for daily sale, including, of course, potatoes and other root crops and fruit; or for the purposes of a milk dairy, or for grazing.

No man can afford to cut grass and haul hay to the city, at double the price it ever sold for. Much less can he afford to raise rye, as some do within two hours of here, at three bushels an acre, trusting to his profit in selling straw.

I challenge any one to disprove these, to me, self-evident facts.

The Chairman—I shall not undertake the task, because I fully agree with Mr. Robinson's statement. Look at the land that might be producing fruit, instead of lying idle or worse than idle; yet we see every day that all sorts of fruits sell at enormous rates; pears at 37 to 50 cents apiece. Bananas sell at 8 to 18 cents each. An acre of ground near the city, cultivated to almost any kind of fruit, will produce a great return. Still, potatoes, at present prices, are the best paying crop that we can grow. A friend of mine assures me that for $1,000 expenses he receives regularly $4,000 in cultivating market produce. Look at the price of rhubarb, 4 cents a leaf, and other things at the same rate. The net profit of rhubarb is $200 an acre. The price of labor is not too high to pay, at the present rate of $1 a day. A farmer must not keep idle men or idle teams. A horse will cost $200 or $250 a year for care and keeping.

Dr. Smith—In England, near Manchester, there are many garden and milk farms upon land rented at an average of $40 an acre per annum, and the general value of the rent of land through all the country is $5 per acre per annum; and yet farmers make money at these rates.

Prof. Nash—With regard to the expense of farming, the first thing is interest on the value of land; next, all other expense;

because it seems remarkable that a farm that produces $4,000 value of crops can be carried on, including interest, for $1,000.

The Chairman—The farm I alluded to last year produced $12,000 worth of crops sold, and the expense, without interest, was only $3,000. And there is no doubt that the same result might be obtained from a hundred other farms in the vicinity of New-York. One of the reasons that farmers do not make more out of their labor is for the want of suitable tools. I don't know of scarcely a single garden where there is a sufficiency of proper tools. Many farmers do not know what tools are really necessary for them to have to make their labor profitable.

Judge Meigs—I move that at the next meeting, which will be the first Tuesday of June, we discuss the best method of putting seeds in the ground.

The Chairman—Let that be added to the present questions of what are the most profitable crops and best rotations.

The weekly meetings of the Club were adjourned to June 2nd, 1857. H. MEIGS, *Secretary.*

June 2, 1857.

Present—Messrs. Ira B. Underhill, of Jersey, Prof. Mapes, Mr. Webster, Mr. Stacey, Mr. Leonard, Mr. Heckrotte, Mr. Chambers, Thomas W. Field, of Brooklyn, Mr. Pardee, Mr. Solon Robinson, Hon. John G. Bergen and Mr. Adrian Bergen, of Long Island, and others—thirty one members.

Mr. J. B. Underhill in the chair. Henry Meigs, Secretary.

The Secretary observed, that by every steamer from Europe we receive, gratis, from England, France, Russia and Austria, valuable journals of the most recent discoveries and improvements in agriculture and mechanics. He read the following extracts and translations made by him, viz:

PLANTING SEEDS.

We translate from the great national work of France "Maison Rustique," (Farm house.) Few if any lessons in agriculture are as carefully made up in the last hundred years, as good as these. We therefore have pleasure in translating them for our use here.

Allowance must in every case be made, not only for the differences of climate and other matters, but also for like differences here in various seasons and localities.

The question of how deep to plant wheat, has been several times demonstrated in France by experiments, from laying seed on the surface to as great a depth as seven inches below, at intervals of half an inch, and the results in each proved—premising, always, the extreme care in choosing the seed, depth of tillage, manure, &c., &c.: Wheat was always found to yield the largest and best crop when planted about one inch and an half deep. Barley and oats, from two inches, to two and one half. Beets, peas, beans, corn and colza, one inch and an half. Flax and ruta baga turnip, a half inch deep. Turnips and carrots, a half inch deep. The seeds for meadows need hardly covering.

In general there should be more seed sown in spring than in fall planting.

Seed planting machines are excellent for uniformity in the quantity of seed and the depth in the soil. These great advantages over hand sowing were understood for many ages, before the mechanics could contrive a suitable one. Patullo began in Spain; Tull, of England, followed and failed. Duhamel, of France, exerted himself to bring it to practical utitity. De Fellemberg, of Switzerland tried it. These are great names in the history of agriculture; but they and numerous followers failed in the great point, that of sowing grain. Numbers were ruined by the expenses they incurred in their experiments. At last a lawyer of eminence in Bourdeaux, Mons. Hugues, hoping to gain a higher merit than that of eminent barrister, set himself to work to make one, and succeeded, and was universally applauded. It was exhibited at the fair of 1834. It harrows as well as sows. It weighs 220 pounds; drawn by one horse ; sows about ten acres a day of grain. There is a crowd of others, Von Thaer's among them. The seed drill is yet an object of improvement. Latterly it has been considered that one may be made with a view to deposit with the grain a suitable quantity of the desired fertilizer. I have always found advantage in giving some pressure to the soil over the seed.

For a number of years, a citizen by the name of Comstock, has petitioned our Legislature for a grant of $100,000, on condition

that he makes public his newly discovered mode of planting seeds—more particularly Indian corn. The method is one on which I have practised forty years, and merely consists in placing the seed very nearly if not quite on the surface. Corn so planted is apt to lay its first leaves almost horizontally, and show vigor immediately, instead of coming up a thin yellow spindle, like a yellow quill. I have always found my crop excellent when its infancy was of the first description.

[Journal de la Societe Imperiale et Centrale D'Horticulture. Paris, March 1857.]

Mons. J. G. Meyer of Ulm, on an improved parsnip, (Gartenflora.)

NEW PARSNIP AMELIORATED.

This new variety of (Pastinaca Sativa,) has been advantageously cultivated for many years in Jersey, and merits a distinguished rank among root crops. The parsnip is valuable for its standing freezing and bad weather so well, when almost all the other roots suffer more or less, and because we can leave them all safe in the ground until we want them. Properly cultivated they always leave a crop equal to that of the giant carrot. They should stand in rows, from seven to nine inches apart. This parsnip is shaped like the carrot, which is seldom less than seven inches in circumference, while this new parsnip is from fourteen to eighteen inches round, by sixteen to twenty inches long. The horse is fond of it; hogs prefer it to anything we give them, and they fatten quick; cows who feed on it do not give so much milk; they grow very fat, and their cream yields butter of excellent taste. The Jersey people are convinced that cattle fed with these parsnips fatten in half the time necessary when fed on potatoes. Good brandy is distilled from these parsnips. We have also a new giant beet, which grows mostly out of ground. We have also a new white transparent carrot, very large. It has a more agreeable taste than most other carrots, and is not quite so sweet. When cooked it peels like the potato. It yields a greater crop than others, and may be sowed thicker than other carrots without harm to the crop. It is as good for the table as it is for the stable, and therefore suited both to the garden and the farm.

Mons. Verschaffelt has received from Mexico, a beautiful *tricolor* Salvia with numerous branches at four points. The flowers as white as show, have crimson on one part and scarlet red on another. These flowers are odoriferous and last as long as the generality of Salvias—it is multiplied by buds or seeds.

THE YEW IS POISONOUS.

The leaves and buds eaten by horses and cattle have been known often to kill them in a few hours, and that when the leaves and buds are dry as well as when green. Mons. Orfila has shown that this poison depends on the age and place of growth in degree.

[Revue Horticole: Paris, April 1857.]

Translated by Henry Meigs.

It has been observed often enough to attract attention, that pear, apricot and prune trees, when in blossom, are protected from damage by spring frosts, when so situated near roads or otherwise as to have dust freely on the blossoms. The least shelter, even like this dust, is a protector. It covers the upper part of the anthers and so preserves the pollen. Therefore we can by suitable apparatus blow dust over our blossoms if necessary.

Prof. James J. Mapes exhibited sawed laths, and explained their quality. Edges bevelled, and placed as usual with other laths. The edge of the bevel retains mortar so much better than the rectangular, old-fashioned laths, that a smooth and perfect wall can be made by one coat of plaster, in place of the old two coats. And the coat cannot fall off. He referred to Mr. Brown, of Jersey City.

Adrian Bergen, in reference to seed planting, said, that it was too true that we usually plant corn too deep, and often we plant it too soon.

John G. Bergen had found by long experience, that corn ought not, in ordinary seasons, to be planted more than half an inch deep, but in a dry time he plants it rather deeper.

Prof. Mapes—I plant corn a half inch deep.

John G. Bergen—Some of my neighbors pursue a method of planting cucumber seed that is peculiar to them. They divide a hill into four parts, put thirty or forty seeds in one part; next

week, as many more seeds in another part, and so on to the fourth part. As the plants rise, the striped bugs and black cut worms attack them, but the number of plants is now sufficient to feed all the bugs, and leave plenty of plants for us, say five in a hill. Some of our folks have ten acres of cucumbers. I plant melons three times. All the soot, lime, snuff, &c., have proved unavailing. If you will have plenty of cucumbers and melons, you must first feed all the bugs.

Chairman—Are ashes of any service on the hills?

Adrian Bergen—I think that both ashes and lime are of some utility against the insects.

Prof. Mapes has raised great numbers of melons, and never loses any when he uses a method of his own contrivance. Small wooden boxes, some eight or ten inches high, set over the hills. These cost but two dollars a hundred. The box causes the plant to grow vigorously, somewhat on the principle of a mulch, and the cut worm comes up to its sides, but cannot get in. The bug on wing flies to it, but the sides of the box are in his way; he flies around it, cannot dive into it, and at last hits his head against the side of the box, and falls down stupified if not killed, he is stiffened at any rate. I have not lost a cucumber or melon plant these eight years.

Chairman—What do you say as to the almost universal practice of hilling up corn?

Prof. Mapes—Flat cultivation of it is preferable, especially in under-drained land.

Chairman—I did not find as large crops of grain per acre in the valley of the Nile, as our good farms yield, notwithstanding the long boasted fertilizing power of the waters of inundation or irrigation. When the water of the Nile is low, its water is cold, limpid and remarkably delicious. And I found the water of their unglazed jars cold enough to make my teeth chatter. And I found the day heat a hundred degrees of Fahrenheit, and at night often only forty degrees. Indian corn lasts two years. The first year yielding its ears, and in the second year a growth of leaves and imperfect ears from its joints, making an abundant forage.

Mr. Thomas W. Field, of Brooklyn, thought that Indian corn would be a profitable crop near this city, on account of market; so that we can beat Illinois at that.

Solon Robinson—I like the gentleman's theory about the corn! But I understand he raises instead of that, wheat!

Prof. Mapes—I think the most profitable crop is carrots. I can grow 110 bushels of corn per acre, but I can't afford to grow it, because I can do better by growing something else. I have sold $200 worth of rhubarb from three-quarters of an acre this spring; expect to get another $100, and this crop don't take as much work as a corn crop. I can get 1,000 bushels of carrots per acre, and sell them at fifty cents a bushel; parsnips this year, sixty-one cents; beets, seventy cents a bushel. The tillage of an acre of carrots costs no more than an acre of corn; the manure $12 50 an acre. I do all the work by teams and machines, even the digging. My crops are all better than corn at 110 bushels an acre.

Mr. Field—All crops are profitable to a right mind—one that cultivates with skill. But all cannot be market gardeners, however good they may be at ordinary farm crops. I don't think that one man in six that tries, raises a good crop of carrots. I know men who grow rhubarb, five or six acres in a piece, that yields $500 an acre. But all men cannot raise rhubarb, or the market would be overstocked. I noticed one of the great rhubarb growers on the island plowing up a part of his plot, because he had got more than he could attend to and sell profitably. But you cannot raise too much corn. What we want to know is, what is the crop that all can grow to profit with ordinary skill, and that is Indian corn; because, if properly cured, the stalks are worth $25 or $30 an acre for feed, if properly cut and wet, and sprinkled with bran, and cows and horses all eat this feed and fatten. The top stalks are worth as much per ton as hay anywhere, and the grain here will average $1 a bushel. In Illinois it is worth eighteen or twenty cents, and the stalks nothing.

John G. Bergen—As one crop, I think the potato crop more profitable than corn, but I would not advise any farmer to confine

himself to any one crop. It may succeed one year and fail the next. Wheat sometimes fails over whole regions. When a farmer gets confined to one crop it is difficult to get out of it, even after it does fail.

Mr. Field—I do not advocate corn as a specialty, though it is a crop that will always sell—you cannot overstock the market with corn. Tomatoes will sometimes bring $600 an acre, but that is not certain.

Mr. A. Bergen—Every farmer should always grow corn, even where other things are fruitful.

Prof. Mapes—I believe that potatoes are more profitable than corn. The high price is kept up by our immense number of immigrants. If 200,000 immigrants are landed here this year, they will require 200,000 bushels of potatoes at least; and that sort of extra annual demand upon this crop will always keep it at a high figure, as compared with other products of the farm. Besides, I raise one kind of potatoes, the Mammoth nutmegs, which I sell for seed at two dollars a bushel.

Prof. Mapes—I must say, if my whole place was covered with the richest crop of corn, it would not pay me what I now get.

The Chairman—I have lately been in Egypt, where our Indian corn does not die the first year—it shoots out a great quantity of forage the second year. Wheat grows largely on the plains of Thebes. It is cut with hooks, with teeth like the teeth of a saw. They are very rude implements, and the work of harvesting progresses slowly.

Dr. Smith—What we hear of the farming and gardening about us, makes me think it a very profitable business.

John G. Bergen—As the sole crop of a year, I think the potato the most profitable. One must use all his skill and capital in it, yet it does not always turn out profitable. It is much safer to divide crops. The county of Seneca once grew large and valuable crops of wheat. The weevil came among them, and the wheat farmers almost pinched with poverty before they turned their farms to oats and other crops. Some farmers succeed with some speciality crop. My neighbors, on Long Island, near the

west end of it, raise special crops. Mr. Jaques raises ten acres of cucumbers, which pay him from two thousand to two thousand five hundred dollars an acre. Mr. Bennett's tomatoes given him, when first come, probably one thousand five hundred dollars a week. Some others of my neighbors sell their crops for from ten thousand to twenty thousand dollars a year. Their gardens are from ten to fifty acres each. The crop at twenty thousand dollars, leaves the gardener some profit.

Mr. Field—Mr. Barnet Johnson has found his rhubarb so little profitable, that he has plowed up an acre of it to grow something better.

Prof. Mapes—I have sold mine for ten dollars the hundred bunches.

Mr. Field—A smart and very industrious neighbor of mine pays a rent of twenty-five dollars an acre, for six acres, on which he puts one hundred and fifty dollars worth of manure, and his variety crop gives him about six hundred dollars an acre. He has from two to three crops a year.

Prof. Mapes—Yes, sir; we supply country towns with vegetables. I believe that fifty wagons loaded with vegetables from the New-York markets, daily, reach Newark and so to other towns in the neighborhood of New-York, where respectable middle-men transact immense business, between gardener and citizen, and they do it fairly, as merchants do. I receive their checks as readily as those of merchants. The cabbage crop is worth a few words. Few persons are aware of the tremendous demand for them south of us, where cabbage does not seem to do so well as here. That southern market has never been glutted by the right sort, that is prime heads. I have sold off my farm, from one acre, twelve thousand heads of Bergen cabbage, in a year. I place them so near together as to lap one another, and thus mulch the ground completely. I got six hundred dollars for them. The cauliflower market is rather overstocked; they cannot be exported.

Mr. Lowe—On my late tour I saw, at Caledonia, Canada, cabbages, brought from Albany, selling at eighteen and three-quarter cents a head.

Solon Robinson desired members to examine a coal cart, brought to the door for examination. It is self-weighing, and any one can see what the true weight is at once.

Prof. Mapes invited members to examine his farm, utensils, &c.; among the rest an entirely new mill, which does more perfect work than any one ever invented. It is a combination of steel discs, which cut instead of grind, sharpening one another as they revolve, leaving flour in its proper state, never mashing anything, grinding (so saying) everything you put into it; doing a large amount of work with comparatively small power. Cost of this mill, fifty dollars. Power, a boy and crank.

Solon Robinson—I have examined it, and I endorse every word the Professor has said about it. Go and see it on Saturday.

Prof. Mapes—I will also show you my machine for spreading pulverulent manures (like ashes, guano, or others) over ground, as evenly as if it was painted. Let us have for next subject, "the manipulations of land for crops." Adopted.

The "best succession of crops," continued.

The Club, at nearly 3 o'clock P. M., adjourned.

H. MEIGS, *Secretary.*

June 16*th*, 1857.

Present—Messrs. Marcus L. Ward, of Jersey, Doughty, Solon Robinson, Stacey, Lawton, of New Rochelle, Adrian Bergen, of Gowanus, Long Island, Knight, of Tennessee, Pardee, Stuart, Olcott, Dr. Waterbury, and others; thirty-one members in all.

William Lawton, of New Rochelle, in the chair. H. Meigs, Secretary.

The Secretary read the following translations and extracts made by him, from works received from Europe, &c., since the last meeting, viz:

We have received from Paris, a pamphlet from the Société Impériale et Centrale, under the protection of Louis Napoleon, containing the competition for flowers and plants of beauty, to be exhibited in the Palace of Industry, from the 15th of June to the 15th of August. First Vice-President, PAYEN.

Secretary General, ANDRY.

[From the Journal of Education, Montreal, April, 1857; from Mons. Huguet Latour.]

How many seeds in a pound, on an acre, &c., if, in ordinary practice, 1,200,000 seeds of wheat are sown on every 40,000 square feet?

THE PLOW.

The great agriculturalist of France, Duhamel, admired the plow invented by the great agricultural master of England, in 1750.

Tull's theory was a deep and thorough tillage, pulverizing and mixing soil as much as possible. His plow, therefore, was constructed with four coulters, instead of our one. His cutting the soil into slips two inches wide, before they are lifted and turned over by the plow. And with this plow Tull tilled the land ten, twelve, and even fourteen inches deep. It required three horses to do it.

MUSHROOMS.

Mr. Meigs said, that Prof. Mapes is making a grand experiment, on a large scale, on his Newark farm, for the growing of the true edible delicacy, the mushroom.

As France leads in this article, we take from her excellent Farm House (*Le Maison Rustique*) the following account of their means of success:

"The cultivation of mushrooms, with the exception of the environs of Paris and some large cities, is very little attended to in France; and yet it presents great advantages to the professional gardener, and is as useful as it is agreeable to the amateur gardener.

"We will now endeavor to combat those two extensive prejudices entertained generally against the use of them as aliment. They are generally viewed with suspicion, on account of the frequent accidents from eating them.

"Modern naturalists agree in placing mushrooms on the extreme verge between the animal and the vegetable kingdoms, but much nearer to the animal. In fact, their substance is highly azotized, and, in boiling, exhibits all the character and even smell of the asmazone of boiling meat in the most concentrated form.

"Mushrooms have the same effect as animal food, and they satiate appetite in the same way; nor can they be eaten except in moderate quantities, when compared with vegetable food. When taken at the time of their perfection, they cannot do harm, and, in fact, are then as nourishing as meats. But when too much of mushroom is eaten at one time, violent indigestion is apt to be caused. The very same mushroom which is healthy and nourishing when picked at the right time, becomes a poison if picked some hours too late.

"We know how unwholesome all meat becomes by being unsound even a little. Mushrooms in a very little time reach putrefaction. And it is too true, that the three sorts of wild mushrooms good to eat throughout France, the south only excepted, where they eat them with impunity, are mortal in the climate of Paris. They are there called oronges. Cardinal Caprara thought he knew mushrooms well enough; he had these oronges cooked, and, in spite of all remonstrance, ate them, and died, together with his native cook, who prepared them for dinner. But all danger disappears when mushrooms are cultivated in beds, for no unwholesome ones will grow there; so that the cultivated mushroom is free from all danger, if gathered and eaten while fresh. The white, for production, is always taken from horse, ass or mule dung. The beds need equal temperature, darkness and little humidity. The temperature must never exceed about 51° Fahrenheit, nor fall below 49°. The English have cultivated them on a large scale, and their books contain their methods; Miller's Dictionary of Gardening, and others. Mr. Wales mixes two parts of cow dung with one of sheep and one of horse. The white seems perishable, and yet it can be preserved in all its energy for many years, by keeping it in a very dry place. Miller found it more productive than fresh white."

Thirty or forty years ago, I sometimes gathered, within two miles of Perth Amboy, New Jersey, in the autumn, on old pasture grounds, abundance of the best mushrooms, and treated myself and family often with their delicious relish, with as perfect subsequent health as can be enjoyed. I gathered those that were fresh, and ate them at dinner.

FOOD CRISIS IN FRANCE.

"Happy is that nation which has a ruler or a minister who has the talent and will to discover the root of the national difficulty, and the remedy, and apply it. Mons. Fould, the confidential adviser of Napoleon, is now busy in examining the causes of dearth in the south of France, especially, where in whole districts a true plow is utterly unknown, where the soil is merely scratched with a pole, to which a bit of wood, pointed with iron, is attached, at an angle of forty-five degrees. The coulter belongs to another hob. It is a wooden peg, drawn like the aforesaid plough, by two oxen. The plowman guiding one team with his right, and the other with his left hand. Everywhere noxious weeds abound in full liberty. Full one-third of the grain crop of France is destroyed by the weeds. Drainage is yet all theory. But look at the agricultural colleges, model farms, and farming schools there; the public shows, the great ones of Paris, the premiums; all, all worthy of praise, but of little or no good. They are remedies applied at the wrong end. The late grant by government of 100,000,000 francs for drainage, hits the evil in the right spot. The government is on the right track, by developing the vast resources lying beneath the weedy surface of her rich champaign, her multitudes will cease to hunger, and there will be prosperity at home."

[London Farmers' Magazine, April, 1857.]

THE THREATENED APPROACH OF THE MURRAIN.

There is nothing the agriculturist hears with so much alarm as the rumored outbreak of murrain or cattle disease. In this age especially, when the stock of the farmer is becoming more and more valuable. The murrain is now raging with fearful severity in those States with which we are in direct or continual communication. It pervades with more or less intensity many parts of central Europe, from whence we continue to receive our customary importation of cattle. One animal has been condemned here already, and one of a whole head may easily carry the germ of the disease. Our government seems to have done nothing, while other States have taken keen and active measures. Almost every fatal cattle plague here has been imported.

After the most careful and patient investigation, our best veterinarians still declare that these diseases can be more easily prevented than cured; that the disease does not show itself for many days after it has been contracted. If any thing is to be done, it must be done quickly. On the continent, the most extreme measures are at once resorted to. When one beast is seized they immediately destroy the whole herd with which he has been going.

Mr. Meigs—This disease is a malignant influenza epidemic, long known, but with some characteristics different from its ancient form. It raged on the continent of Europe from 1710 to 1746. The best work on the subject is that by Mons. Sauvage, a celebrated professor of medicine, at Montpelier. Murrain was extremely fatal in England in 1757, and excellent account of it was published by Dr. Layard, of London.

In England, this disease appeared as an extremely malignant, inflammatory *œdema*, (tumor), attacking, and indeed, confining itself, for the most part, to one of the hind-quarters of the animal. It is most common in spring and autumn, and principally affects young cows. The most general and prominent features of it are tumefaction, (swelling), and a discoloring of the side affected, with consequent lameness and inability to move. A peculiar *emphysema* (inflation), of different parts of the body, particularly over the region of the spine, and all the symptoms of putrid fever in typhoid cases. It speedily runs on to gangrene, (loss of vitality,) and few animals survive an attack more than ten to twelve hours. It is generally deemed incurable; if it is done at all, it is by means of extensively scarifying (cupping) or incisions of the affected parts, and by fomentation and purgation.

The best of all preventives is warm and sheltered places, rest and quiet, free circulation of air, daily fumigation with chlorine or chloride of lime. Examine the cattle daily, and if one is attacked remove it immediately.

SILK.

We extract the following from the excellent Journal of the Society of Arts and of the Institutions in Union, 1857: London.

From F. Bashford, of Surdah, East Indies, who has devoted himself for nearly twenty years to silk-reeling, in Bengal. The

experiments were made by the work of forty filatures, working four thousand five hundred basins. All our worms in Bengal give us for filature silk several crops of cocoons during the year, except a solitary species of annual, origin unknown, and rapidly becoming extinct.

The chief worm is called the Dessie, or as the word implies, country. It supplies nearly all the cocoons of the large November bund, or cold weather crop of Bengal, and yields the finest silk.

The cocoons are small, and are sometimes called the "chota-poloo," or small worm. The produce of the best quality is about 10,500 cocoons to one pound of silk. This worm thrives best in cold weather. The hatching of the egg to the completion of the cocoon of this worm, is about thirty-six days in cold weather, but much less in hot weather.

The next species is the Madrassie, meaning sea-born. It is sometimes called Nystree. It is produced throughout the year; thrives best in hot weather, from March to September. From hatching to full cocoon, often only twenty-five days.

The Bozo-polo, or large worm, is an annual; it is, however, failing. These worms make 10,000 cocoons to one pound of silk; while in France, 2,500 cocoons makes the same.

In 1854, I imported, overland, a large quantity of the best French silk worms' eggs; only 5,000 or 6,000 were good, out of a very large parcel. Some commenced hatching fifteen days after the boxes were opened. Fahrenheit thermometer sixty to seventy degrees, and so on, hatching irregularly, until at noon, Fahrenheit marked one hundred degrees in the house. The Bengal natives were astonished at the warmth of these worms. I crossed the native worm with the French, and the product was equal to the French. But, in 1856, I found my improved stock, much of it, had reverted to the old annuals.

The Syrian cocoon is nearly equal to the French. I have not experimented on the wild worm and others, (the Bomby and Huttoin,) but I believe they can be, some of them, domesticated.

The Société Zoologique d'Acclimation (Napoleon's) is producing wonderful changes. Our Bengal operatives in the filatures, get off the same amount af cocoons, at least one and a half pounds of silk, where we get but one pound, and at a far less cost than we do,

BEST SUCCESSION OF CROPS.

We translate from the great national book of France on agricultural matters, their latest theory and practice in the successive crops on the same land, viz:

France calls this method assolement, from sol, soil and division of it; *solum*, Latin, into solums, or plats of soil.

Man first tills the ground for his own food, then for his stock, then he manures. These three purposes prevailed over the greatest part of Europe. Natural meadows also fed stock; then came artificial ones. Thus began a better system. It was seen that the various plants were not equally exhausting to the soil.

Although those vegetables which live in families are not very common on our globe, yet in some instances we find such a family maintaining its ground for long periods; at last they gradually lose their vigor, and new, different plants invade them, and soon drive them all out. We often find this in both our natural and artificial meadows and pastures. Thus white clover, (*Trifolium repens*, or creeping clover,) the lupuline succeeds, &c. In some countries, such plants as destroy our crops come alternately on the same soil. Trees themselves obey this law of rotation. In 1746, an immense fire destroyed part of the forest of Château Neuf; that forest was chiefly of beech. The ground thus cleared by fire was soon covered with plants and brush, among which started up an indefinite number of young oaks.

In 1799, the woods of Lumigny and Crecy were cut off; the beech soon took possession; also raspberries, gooseberries, strawberries, brambles, then oaks, which are now in full growth. And so of many other locations. A four year rotation of the following crops does well:

1. Any crop which needs weeding.
2. Oats.
3. Clover.
4. Wheat.

Much depends, of course, on the seasons, whether in crops of rotation or otherwise. Fallowing must almost be admitted to the judgment of the farmer, for land requires rest more than it has in winter, if actively cultivated. In the justly boasted county of

Norfolk, England, the turnip is the pivot of the four year rotation. The five year rotation is less generally in use.

The Suffolk county rotation:

1. Turnip.
2. Barley.
3. Beans.
4. Wheat.
5. Barley.
6. Clover.
7. Wheat.

And a longer period of rotation is tried; for instance, Mr. Dailly: 1st, lucerne; 2d, 3d and 4th, lucerne for soiling; 5th year, plant lucerne; 6th, oats; 7th, potatoes; 8th, spring wheat; 9th, colza; 10th, winter wheat; 11th, winter beans and colza; 12th, oats; 13th, field poppy or roots; 14th, winter wheat; 15th, roots; 16th, spring or winter wheat.

Dr. Waterbury—In remarking the diseases incident to animals, we cannot fail to recognize the close resemblance in many of them to human diseases, and we must always make allowances for difference of climate, condition, and proximate causes. I will, if desirable, say something on this subject, at some convenient day. As to the rotation of crops, we must also say, that analagous circumstances must control that rotation in our country; as, for instance, we must have place always and everywhere for our own original American zea maize, Indian corn. Clover is an excellent precursor of the cereals. On the large scale, a heavy crop of red clover is always a good forerunner of Indian corn, wheat, &c. The real condition of soil is always indicated by the trees upon it; and in some of our State lands the poorest invariably grows hemlock, with peculiar satisfaction, but nothing else.

STRAWBERRIES—A NEW SEEDLING.

Marcus L. Ward, of Newark, exhibited a very remarkable, large, fine new seedling strawberry-plant in bearing, originated by Mr. Seth Boyden of Irvington, N. J. Some of the berries are four and a-half and five inches in circumference. Mr. Boyden is well known as the inventor of some useful improvements in the steam engine. He is now engaged in inventing new fruits. His

manner of producing seedling plants is novel, and, as he believes, expedites their production. He produces by artificial means the same thing that the cold of winter produces.

The berries of this plant being so very large, and growing solid and of a handsome crimson color, will be valuable for market gardeners, even if not very high flavored. We think it well worth the attention of cultivators. Mr. Ward, who is a relative of Mr. Longworth, says Mr. Longworth is much pleased with this new seedling.

Mr. Pardee—I don't think there is any necessity of the freezing process mentioned, to produce new seedling strawberries. And I judge from the structure of this plant that it is not a prolific bearer. The fruit is very large and handsome, but is it an improvement? The shape and color of this berry shows that it is very like, if not really, a Longworth's prolific. It is a settled point that the Running Alpine strawberry never hybridizes with any other variety. The Bush Alpine makes a beautiful border, much better than the box plant.

Dr. Knight—I have noticed in Paris that the strawberry season is much longer than it is here, and I should like to inquire if any person has ever attempted to prolong their bearing by artificial means, and with what success?

Solon Robinson—I will answer that question. Mr. Charles Peabody, of Columbus, Georgia, is the only successful cultivator of strawberies, I believe, in the United States, who has pursued a course that prolongs the bearing season. He has sent his fruit regularly and continuously to market for six months of the year, from the same beds, and his vines have produced fruit ten months out of twelve. Now this is all accomplished by very simple means, and is not at all in consequence of the latitude, except that the bearing season may commence earlier there than here. At first, Mr. Peabody grew vines upon rich soil, and the consequence was that he grew vines and not fruit; he could at any time mow a heavy swath of just such rank leaves as these before us; but as he did not want to grow strawberry hay, and did want to grow fruit, he began to think what nature did to produce strawberries, and changed his course. He then set his plants

upon newly cleared sandy land that had a mere skin of vegetable mould, and from a brook near by he kept the plants well watered, generally twice a day, and in the fall covered the ground with leaves and perhaps a sprinkle of woods mould, just enough to paint the sand, and there he actually grows plants that produce, by measure, more fruit than leaves, from March till October. And the same thing can be done here, upon any soil that is poor enough.

Mr. Pardee—I have no doubt of the truth of Mr. Robinson's statement, because I have seen Mr. Peabody's plants bearing fruit in December. There is one other man who does the same thing, Mr. Henry Lawrence, of New Orleans. He pursues the same course, and gets berries all the long hot summer. The secret of this long continuous production is, keeping them in poor ground. Fertility produces leaves, not fruit, on strawberry vines. Strawberries out of season would always sell at high prices. I have no doubt they can be cultivated here in the same way. The average crop of strawberries near this city is thirty or forty bushels per acre. A well cultivated crop will produce from one hundred to two hundred bushels. Look at the profit of such cultivation: The ordinary price will average about eight dollars a bushel; but such berries as these Boynton seedlings would bring sixteen dollars a bushel. It would be easy to get one thousand dollars' worth of strawberries per acre.

Judge Meigs—When Thomas Bell moved from Westchester county to New Jersey, he found about five acres of strawberries on the farm he bought, and as he had never cultivated such a crop, he did not know the value, and sold the chance to a neighbor, who offered seven hundred dollars cash, in advance. After the bargain was closed, Mr. Bell asked him what he expected to get for the crop, and he replied that he should be pretty well satisfied with two thousand dollars. The expense of cultivation is not large; the cost of picking, say five cents a quart. The present price is about fifty cents, at retail, for the best.

The same subject ordered to be continued, viz: By Prof. Mapes. "The manipulation of ground for crops;" and "the best succession of crops."

Adjourned. H. MEIGS, *Secretary.*

July 7, 1857.

Present—Messrs. Pardee, Dr. Waterbury, Mr. Stacey, Mr. John V. Brower, Dr. Wellington, Prof. Nash, Dr. Smith, Solon Robinson, Prof. Hildreth and others—27 members.

Dr. Waterbury in the chair. Henry Meigs, Secretary.

Mr. Meigs read the following translations and extracts made by him from documents received by the Institute by the steamers, &c., since the last meeting, viz:

[Journal D'Agriculture Pratique, Second Partie, DeLaMaison Rustique, Du 19th Siecle Quatrienne Serie, Tome 7th, 5th Juin, 1857.]

Presented to the American Institute by Mons. Alexander Vattemare.

Statistics of the State of New-York are given by Mons. Vattemare, in which he includes a catalogue of seeds prepared for the World's Agricultural Fair of Paris, for 1857, by Col. B. P. Johnson, Secretary of the New-York State Agricultural Society. They were fine samples of our wheat, rye, Indian corn 13 sorts, barley, oats, buckwheat, timothy, clover, flax, millet, pumpkin, peas, beans, in all their varieties; with a fair statement of the agricultural capacity of the State in all respects—the number of farms, and their general productions.

Mr. Vattemare says that the State of New-York has giants in her agricultural children, and they keeping pace with her industrial economy—every county having its agricultural society—the central one being that of the State, at the seat of government, Albany. That the American Institute, the society of encouragement of the State, presides in all the exhibitions of agriculture and horticulture, annually, in the city of New-York, and gives (like the central society at Albany,) an immense impulse to the progress, from day to day, of those two societies—a progress whose grandeur has no perceptible limits—for the treasures of our "Alma Mater," mother earth, are inexhaustible.

The Regents of the University of New-York, publish very interesting works in this line.

We cannot better close our observations on New-York, than by rendering to her that homage which is due to her, especially for that magnificent work with which she has endowed the learned world, (monde savant.) We speak of the Natural History of New-

York, composed of twenty large quarto volumes, illustrated by upwards of fifteen hundred colored engravings—six volumes of them consecrated to agriculture and horticulture.

This admirable work, which has cost the State an immense sum of money, is spread by the munificence of the State broadcast through the world. In our international exchange, we have received for the French Empire and some other, forty-two copies of this noble work—on the liberal plan of exchange, without the slightest reference to cost. The letter from Col. Johnson relative to the seeds, &c., is given, translated into French. It is dated Albany, Feb'y 1857.

Note.—The great work alluded to by Mons. Vattemare, was petitioned for by the American Institute, and has cost some $400,000. H. Meigs, Sec'y.

[Societe Imperiale et Centrale D'Horticulture. Paris, April 1857.]

Translated by Henry Meigs.

A BUCKWHEAT—POLYGONUM SIEBOLDI.

By Dr. Karl Koch, Germany, a forage plant of much value.

Von Siebold resided long in Japan, and observed its plants carefully. He says this plant is universally cultivated in the whole Japanese Empire, for forage.

It has an extraordinary vigor in its growth, and is besides beautiful for its flowers—small white blossoms in clusters, some few inches in length—the foliage very fresh and elegant—it runs much from the root and stools out. In the first year of planting the parent stalk is surrounded with long shoots, which soon cover the ground. It starts up in April, and by the middle of May is three or four feet high, and resembles a bush. In September it is six feet high, and often more, growing in tufts about as thick as it is high. These stalks begin by being very tender and end by hardening a little. Cattle love it, and soon fatten upon it; but horses will not touch it. It grows as well on sandy land that is very poor. It has great nutritive power, superior to any clover, being in the relation of 209 pounds to 346 of common clover, and 380 of the incarnatum—carnation clover.

[Journal De La Societe Imperiale et Centrale D'Horticulture. Paris, April 1857.]

TREE PÆONY.

The gardens of Europe have had this magnificent flower but recently, although it was known since the middle of the seventeenth century. It came from China, by the Dutch Embassy, in 1656. It was the favorite flower of the Mandarins, who called it the king of flowers. It did not differ much, except in size, from the roses of the day. It surpasses the rose in beauty, but has not the perfume. Their general color is white, mixed with a little purple—but there are some yellowish and some reddish tint. Every Mandarin has them in his garden. Mr. Banks, of the Royal Society of London, engaged several Canton merchants to procure some of the plants for him. Many were sent, but almost all of them perished on the passage. In 1794 they were successfully introduced.

It is said to have been cultivated in China for the last 1,400 years. Some of the Chinese historians, say it has by peculiar cultivation, transformed from the common herbaceous Pæony, growing in the Province of Loyang, nearly ten feet high. Other writers say that it was found wild on the northern mountains of China. When first introduced it caused a sort of tulip mania—so that a hundred ounces of gold were given for the best plant. The Chinese multiply them principally by the seed, and have made two hundred and forty varieties, some of which possess delicious odor. Mr. Fortune, of London, has brought from China very beautiful plants, surpassing all former sorts in size of flower and beauty of tint.

PETUNIA.

This plant makes great progress in our gardens latterly, and numerous varieties of its flowers are obtained by our horticulturists, far more beautiful than their originals.

Mons. Regel, by long experience and opportunity, has raised new ones, with very large flowers, and some with their flowers bordered with green.

Mons. Regel sows the seeds in February or March, in shallow pots—with a soil of two parts of heath soil (quite light,) and one-half part sand, with one part clayey soil. For want of heath soil,

turfy soil. Mix perfectly, smooth the surface, sprinkle over a very little fine sand, and then scatter the seeds over it as lightly as possible, then fine sand just enough to cover the seeds, then put the pots in a suitable hot-bed in the compost warmed from below, &c., &c.; water them with a water pot, nose having very fine holes in it, so as to deliver delicate streams of water, or put the pots over vases of water. They may do if put near the windows of a good warm sunny chamber. The pots ought to have glass covers over them to retain the moisture. When the plants are up, which soon takes place, keep them in well tempered air; let the sun shine on them; gradually lift the cover, until at last you remove it altogether.

When the plants are one foot high, it is time to set them out in the garden. This, however, had better be done in boxes or pots of large size, mixing rich soil with leaf mould, or turf mould and sand.

Set out the young plants three centimetres, equal to about one inch and one-fifth of an inch apart, setting the plants in the soil as deep as the cotyledons. It is good to set the pots in a warm bed. In good weather they should have the air free, but not in cold winds. They don't want shade, but they do require free air. Sprinkle the plants with liquid manure, occasionally.

To preserve a peculiar Petunia—we propagate by slips—thus we obtain vigorous young plants, which we put into pots for winter. Slips may be grown from May to the middle of July. For slips we choose shoots from eight to eleven centrimetres long, (about 3¼ to 4⅜ inches,) such as have no flower buds on—we put one of them, in a pot of small size, or several together in a shallow pot in soil, much more sandy than usual. We set these pots in a shady place, in a temperate hot bed, where the air cannot move them. As soon as these slips put out roots we must transplant them in larger pots. Without this operation, many perish. In August or September, these become strong plants.

[Illustriste Gartenseitung. Germany.]

HYACINTH AND BULBS.

Some good lessons as to flower bulbs, (Hyacinth, &c.) When you buy them, ascertain whether they are solid and heavy; neve mind great size without these, for the heavy solid ones will certainly produce you larger and finer heads!

PRESERVATION OF SEEDS.

Moisture is the great difficulty with us. The vast longevity of some seeds is well known to physiologists ; but how long some seeds have lasted, or will endure, it is as yet impossible to say. Second forests, of different trees, present phenomena not yet sufficiently studied by botanists. A serious examination will doubtless give us discoveries in physiology, of the very highest interest.

COMBUSTION WITHOUT SMOKE.

The Secretary General communicated an extract from the bulletin of the Society, for the encouragement of National Industry, on an apparatus presented to the Society, for combustion without smoke. It is an invention of Mons. Dumery's. He had it in operation in the glasses of the Museum, for sixteen days, without producing the least smoke.

[Journal De L'Instruction Publique. Montreal, April 1857.]

[Presented to the American Institute by Mons. L. A. Huguet Latour, corresponding member.]

Extracts, translated by H. Meigs.

In eighty-nine years there were two masters only of the public school of Hareville.

There were but two masters of the public school of Germany, of whom Mons. Renaud, the last, is still in office.

At Usseln, in the principality of Waldeck, in Germany, the masters have for about two hundred years, been of one family—the *Genuits*. The present one has served fifty years.

Louis Napoleon is establishing a college in Algeria, where French and Arabic languages will be taught.

Mons. Guerin Meneville, has presented to the Academy of Science, Paris, some samples of wheat grown from five grains of wheat, obtained by Mons. Drouillard. from an ancient tomb in Egypt. Those grains, so long preserved, have grown and produced each, twelve hundred grains—much of which has been sown on several farms, in the south of France.

Just experiments have proved that this wheat, of some thousand years ago, is superior to all our modern known species.

The honorary premium for the Department De L'Indre has twenty competitors from the improvement classes.

The condition of its agriculture fifty years ago is well worthy of notice by way of comparison with the modern advance.

A Prefect made the following speech about it, viz:

"Half a century ago, there were few of the departments of France which had made more than a feeble progress—I may say that among them agricultural science was an infant! and it is to be feared that in many places, it will still remain so for a long time to come!

"Indomitable routine! wretched old habit! repels all new principles, discoveries and experience, without even an examination, rule, or even an answer! except perhaps 'well it's our way.' Now there is a tendency to amelioration—of recent date—a course of planting a rotation of crops—artificial pastures—Lucerne that marvel of the fields—various forage plants and flocks of sheep, &c.—crossing of breeds with the Southdown race, augmented wool and fat—some good efforts in improving cattle, horses &c.—good agricultural implements, tile drainage, sub-soil plowing, the railroads—the new capital invested in farming, more intelligence, order and true economy are creating prosperity and securing a happy future."

Mons. Lucas, a member of the Imperial and Central Societies of Paris, and of those of Marseilles, Havre, St. Germaine, &c., writes June 6th last, to President Pell, stating that he has discovered a process by which all plants and flowers can be preserved with all their colors as fresh and beautiful as when alive, so as to enable any person to form albums and herbariums which will keep without loss of beauty indefinitely. The scientific journals say of it—"The flowers of Mons. Lucas sleep, but never die."

Mons. Lucas, desiring to render service to horticulture, and to those of its amateurs who possess a decided taste for it, to present gratuitously to all societies in France and abroad, his process, with proper directions for making up their albums and herbariums so ornamental and so agreeable to those who grow the flowers. He desires that every society which approves and adopts his process, shall give him a medal of honor, and admit him an honorary or corresponding member.

A conversation ensued relative to the strawberry, it's character, natural and artificial.

Messrs. Pardee, Robinson, Waterbury, Meigs and Smith, spoke of them.

Mr. Meigs asked Mr. Pardee (who is deeply versed in the theory and practice, as to this delicious fruit,) whether the world ever had such berries as we now have, either naturally or artificially, by hybridation or otherwise.

Mr. Pardee—Never until within a very few years past.

Solon Robinson read the following letter from a strawberry grower at Newark, which elicited considerable discussion and information upon this interesting subject; interesting, because, as we believe, the careful cultivation of the strawberry as a crop, near this or any other city, a most profitable one. Referring to the proceedings of a late meeting of the club, the letter says:

"A suggestion is made by Mr. Pardee that Boyden's Seedling is not a new plant. He says, 'it is very like, if not really, a Longworth's Prolific.' I was at Mr. Boyden's garden yesterday. The plant bears a resemblance to Longworth's Prolific, but the fruit is of a lighter color. It appeared to be an abundant bearer, and is a hermaphrodite. No certain opinion can be formed of its bearing character from the crop of one year. Mr. Pardee doubted its being a good bearer, and a person who was at the meeting informs me that Mr. Pardee stated such was the character of the Prolific. I this morning saw at Mr. Gustin's what he obtained as the Prolific, and McAvoy's Superior. Neither are genuine, and I presume Mr. Pardee has not seen the true Prolific. Here and at the West it bears a full crop of large, perfect fruit, and it has the peculiar character of having some pistillate blossoms, and is the only hermaphrodite that I have ever seen that bears a full crop of large, perfect fruit, and not only attends to his own wives but all the females in his vicinity, and is the most valuable plant known. Wilson's Albany Seedling, with me this season bore its first crop. All the blossoms appeared to have the rare character of being perfect in both male and female organs, and the fruit of good size. The flavor of the fruit was its only fault. If it proves of good flavor, it will, I believe, be valuable as a bearer and as an impregnator, and stand next to the Prolific. McAvoy's Superior

I consider the best pistillate plant in cultivation, from the large size of the fruit and its superior flavor and large crop. There are some pistillates that have some berries of as large a size, but not of as large a uniform size, that I have seen, by one-fifth."

Mr. Pardee remarked that formerly he had supposed it to be very desirable to plant as early as possible, but of late, his observations and experience had induced him to pursue a contrary course. After referring to several articles which succeeded much better by late planting, the strawberry was cited as a good illustration of his experience. His preference, in time, for setting out a new strawberry bed, was the latter part of June, after the heavy spring rains had passed, and the summer's sun had baked the ground, and the first growth of weeds had started and had been killed. Then, if the ground was dug deep and finely pulverized, and the plants set and watered to get a good start, the bed would need but little care or cultivation for several years of successive bearing; and very few weeds would there appear, especially, if a slight coating of spent tan-bark or saw-dust was applied while the ground was fresh. By this plan, he had seen beds in his garden bear five and six years in succession, by an occasional spading under of the old hills and the substitution of runners. The best season for planting for indifferent cultivators, is April, for then plants can be easily obtained, and in the moisture of spring few will die, even if in a measure neglected.

I have no doubt whatever that strawberries could be very easily made to assume a perpetual bearing character, by giving them proper treatment; but this could not be done (except with the alpines) on rich soils, or by the use of exciting animal manures.

Not only had Mr. Peabody succeeded, under the hot sun of Georgia, with Hovey's Seedling, Burr's New Pine and the large Early Scarlet, but Mr. Henry Lawrence, in the 3rd Municipality, New Orleans, had, in a like manner succeeded, on the rich bottom lands in that city, by an admixture of two-thirds river land to the soil, and the application of water as needed, in furnishing his table with ripe strawberries from March until January. Mr.

Peabody succeeded, as stated, on a sandy soil, with a very thin coating of loam, and a mulch of oak and pine leaves, with plenty of water.

A strawberry, in order to assume an ever-bearing habit, must not produce runners freely, or its bearing habit will cease; and the vigor of the vines will soon induce runners, unless the soil is so reduced. Mr. Peabody, the last of December, a year ago, sent some two dozen plants, Hovey's Seedling and Early Scarlet, strawberries in full training, to New-York; but the foliage was very small and vigorous, scarcely a leaf was larger than a two shilling piece, and yet blossoms, green or ripe fruit were abundant. As long as the plants were treated in the same manner, in the same reduced soil, north, they continued in the same habit; and Mr. Peabody says he has no doubt but on the cooler, sandy or gravelly soils of New Jersey or Long Island, properly prepared and well watered, he could easily supply strawberries for the tables or market around New-York, continually, from early-bearing until frost. Mr. Pardee had experimented considerably in this direction, and he fully coincided with Mr. Peabody as to the practicability of the thing in this vicinity. The plants would need perhaps to be trained out of their usual habit of a great overgrowth of vines, and as a consequence, soil reduced below that for ordinary field culture.

As to the cost of production, Mr. Pardee agreed fully with that intelligent and reliable horticulturalist, John J. Thomas, that strawberries could be produced as cheaply as potatoes, except the gathering, or not to exceed fifty cents per bushel. The average of crops about New-York does not exceed from thirty to forty bushels per acre, when, with suitable cultivation, they could easily be made to produce from one hundred to two hundred bushels per acre, and even at the rate of three hundred bushels had been certified to in some of our horticultural journals. Well grown and good varieties of the strawberry produce one-third extra large fruit, nearly four inches in circumference; and such fine fruit will sell for three to four shillings per quart in New-York market. So that in that way the produce of an acre of well cultivated strawberries could easily be made to bring one thousand dollars, or more. It is not pretended that rich and highly manured

ground will not, sometimes, produce a few very large, handsome berries on the overgrown plants; but, on the other hand, large crops are not usually produced on very highly stimulated soils, and very often they prove to be an entire failure. If the ground can be easily irrigated, it will assist ever-bearing plants, and save the trouble of a garden engine, or watering by hand. The strawberry relishes a large amount of water, from some source.

To sum it all up; if the object be to produce very large plants and a few monstrous berries, then apply an abundance of rich manures. If a large crop be wished, do not stimulate highly with animal manures; but drain well, dig deep, thoroughly pulverize and apply leaf or wood mould, if needed, to put the land in first rate order, suitable for good corn or potatoes.

If ever-bearing strawberries be the object, then reduce good garden soil, and water freely.

Solon Robinson—There is a great extent of land lying at the threshold of this city in wilderness as wild as the western prairies, exactly suited to the successful cultivation of strawberries. I allude to the center of Long Island, where land can be bought very low, and, if planted in strawberries, would produce more profitable crops than any wheat farm at the west.

Mr. Pardee—There is another error that has grown out of the discussion of the strawberry question at the last meeting. Mr. Robinson nor myself made no assertion that this fruit should always be cultivated upon the poorest soil. It requires a light, quick, active soil, but not a strong one.

Solon Robinson—I reiterate what I stated, that strawberries will grow upon sand with five per cent of clay, fertilized by a very slight dressing of woods' mould, without any other manure, better than upon richer land.

SUCCESSION OF CROPS.

Dr. Wellington thought the succession of potatoes, after grass, was one of the best plans he knew for the production of this crop. The best potatoes we have in this market are produced upon newly cleared land of Maine and Nova Scotia. My father

once planted five rows, using lime, plaster, ashes and salt, as manure. The salt produced short stout vines, some of them more than half an inch in diameter, and the yield was double of that from any other fertilizer. This was before the advent of the potato rot. Some other conversation followed upon this subject, but the few members present were not generally prepared to greatly enlighten the world to day, and the subject was postponed, together with the others advertised. It was also agreed to discuss the blackberry and raspberry question at the meeting two weeks hence.

SPONTANEOUS GENERATION—WHERE DOES THE SEED COME FROM?

Solon Robinson—I have received two letters based upon the discussion upon this subject that took place in the Club at the last meeting, which I will read for the information of members, without endorsing either of the writers' opinions. The first one is written by O. S. Murray, formerly an editor, I believe, in this city, from "Twenty Mile Stand," Ohio, and quotes his text from the proceedings of the meeting, as follows:

"I should like to know how oaks are produced upon land that has borne other sorts of trees for centuries, without an oak near. Where do the acorns come from? It is not possible that they should lie buried, because, as it is well known, they will not keep. It is difficult to preserve the vitality of acorns over from one year to another. Yet, as we hear, oaks at once spring up where none grew before."

"It is quite conceivable to me that these questions should be puzzlers to believers in such unnatural, and assumed-to-be supernatural powers of creation, as are taught in a book composed largely of fables and accepted as divine revelation. But the observer of nature, who dares to accept evidence against the dictations and denunciations of those who damn others for disbelief of what is unnatural and impossible, can better believe an oak can be in existence without an acorn to have produced it, than that an acorn can be, or at any time could have been in existence without an oak to have produced it. Probably he

believes in the fable that there existed power, one time, to speak into existence somethings out of nothings; themselves believe that the oak was originally made the predecessor, and not the acorn. It is my belief that now, as well as at former periods, powers may, do, and did exist, to produce oaks without acorns. In some parts of Vermont, and elsewhere, oak and hickory, among several other growths are the natural successors of the pine, where there is not the least reason to believe these after-growths could have sprung from seeds such as they themselves produce. There is nothing to show that such seeds could have been there when the trees started. Who does not know that white clover can be produced in a warm and excessively wet season, on ground composed principally of clay recently taken from below the surface several feet, and placed in the atmosphere, sunlight and rain, where no clover seed produced on the face of the earth could have come by any possibility? At this point I am asked why man does not now, here and there, spring up otherwise than by what orthodoxy calls 'ordinary generation.' It does not follow that because some things are not done under our observation, that others are not."

The other says: A writer in your paper of the 27th ult., signing himself "J," in allusion to the reported fact that forests of beech or other trees have been succeeded by oaks where no oaks previously were, asks the question: "Are oaks produced without acorns?" and again, "what will botanists think of the suggestion that they (the new plants) are the spontaneous production of the soil, germinating under the influence of some divine energy which created the first oak that 'yielded seed after his kind?'"

Both these questions are readily answered. "Botanists," and others who have faith in natural law, will think exactly of this suggestion as physiologists would think if the writer had come forward and said, "here am I. It is credibly reported that I never had father or mother; that I am a product of spontaneous generation; that where certain other human beings disappeared I appeared, with no other antecedents than that geniality of nature which favors being and its creation, (an oak after a forest of

beeches)! What will physiologists think of the suggestion that I came forth under the influence of the same divine energy which created the first man?"

We leave "J." himself to answer this question. Thus he may save both the physiologists and the "botanists" further trouble. For it is not one whit more preposterous, and in the present age ridiculous, to suppose a man originated without parents, than to suppose an oak originated without an acorn.

Does "J." believe in laws of nature? If so, does he suppose those laws partial? How can one species of living thing come into existence without parentage, when others cannot, especially so complex and highly organized a thing as an oak? For we find it easier to pardon the popular credulity, which supposes the molds and blights to be necessarily spontaneous, or the philosophic enthusiasm of a Crosse, who believed his electric current called forth living monads from powdered flint, than the cool speculation which finds all the conditions requisite for the growth of an oak in soil, air, heat, sunlight, and "some Divine energy." It is no dogma, nor *a priori* conclusion, that oaks must have parents, and hence must have acorns as well, but a broad induction, obtained in the truest spirit of a rigid philosophy. The two methods, of spontaneous and parental generation, are incompatible. They cannot exist together. The conditions necessary to either one of them forbid the intervention of the other. We may not be able to say that the law of to-day is the law of all time; but we can say, with abundant safety, that, to-day, the law of any one species or individual, in this respect, is the law of all species and of all individuals. So clearly is the law recognized in respect to our race, that we all accept the processes of impregnation, gestation and birth, as constituting the only way through which Divinity itself could become incarnate.

The supposition made by "J.," is as old as the dreams of the Egyptian and Grecian philosophers. Why has it not been substantiated, and passed into our stock of positive knowledge before this?

It has been said, the law of parentage as the condition of being, is not derived from *a priori* grounds. The writer is free to admit,

however, that he has *a priori* grounds for deciding against any such hypothesis as that of "J.," if reasoning from facts should fail him. That hypothesis is too closely akin to the practical atheism of the day—"Whatsoever ye do unto the least of these, ye do it unto me,"—which makes man himself a spontaneous and accidental production, which divides him at its pleasure and convenience into independent and unlike species, and which finds a sufficient reason for the basest inhumanity, in the assertion that certain races, the negro among them, did not spring from the same "Adam and Eve" who inaugurated the line of the boastful and tyrannical Caucasian. We did not say that "J." holds these sentiments, for we do not know; but we do say, that of such theories as he has propounded, this is the legitimate, and in our day, but too prevalent fruitage.

Mr. Meigs called Mr. Robinson to order at the words, "It is quite conceivable to me that these questions should be puzzlers to believers in such unnatural, and assumed to be supernatural powers of creation, as are taught in a book largely of fables, and accepted as Divine revelation."

Mr. Meigs said, that this Club expressly excluded politics and theological discussion, as being utterly out of its true province, which was horticulture and agriculture alone. That no argument could be maintained here on those subjects, for facts are to be stated, and these without dispute. A member may say that it snowed last night above Canal street, and that the snow was all beautifully blue. Another member may say that it snowed last night below Canal street, and that the snow was all white.

And, indeed, it would be anywhere an offence against common decency, as well as evidence of extreme ignorance or vice, to pronounce publicly, on any acre in all christendom, that the Christian revelation was "a book largely of fables."

For several hundreds of millions of the only enlightened nations on earth now rested their hopes of salvation on it; and myriads of enlightened men have done so since the year of our Lord 33. And as knowledge has increased, so has the Christian faith, and will to the grand conclusion. Sinner as I am, I would not give up my faith in the Bible, for the whole material universe.

Dr. Smith spoke of the value and necessity of knowledge of the elements required to grow plants, and instanced the peculiar care found indispensable to grow straw best suited to hat and bonnet making, especially to make the outer silicious coating of the straw right. They pulverized flint, and mixed with suitable soils for this purpose, successfully. Dr. Smith thought, decidedly, that we should avoid all discussion foreign to the actual duties of this Club, however proper metaphysical questions may be in order elsewhere.

Mr. Meigs—A letter from Florida states, that the Chinese sugar cane is three feet high, is flourishing; and the writer (John B. Meigs) has seventy-one hills of it, which he means to save the seed of, for more extensive planting next year.

Mr. Pardee proposed as subjects for next meeting, "the blackberry and raspberry."

Dr. Waterbury proposed, also, "ammonia."

Professor Hildreth presented a beautiful specimen of parafine, from Breckenridge coal, from the Williamsburgh works. It is hardly to be distinguished from spermaceti.

The Club adjourned. H. MEIGS, *Recording Sec'y.*

July 21, 1857.

Present—Messrs. Lawton, of New Rochelle, Evhard and Freeman, of Ravenswood, Long Island, Dr. Edgar F. Peck, of Brooklyn, do, T. W. Field, do, Mr. Tillman, Dr. Smith, of the Times, Mr. Solon Robinson, Mr. Van Wyck, Mr. Brower, Dr. Waterbury, Mr. Stacey, Mr. Jennings, Mr. Barlow, Judge Scoville, Adrian Bergen, of Gowanus, and others—twenty-eight members.

Adrian Bergen, of Gowanus, in the chair. Henry Meigs, Secretary.

The Secretary read the following translations and extracts made by him from works received by the Institute since the last meeting, viz:

[Revue Horticole. Paris, May, 1857.]

PASSION FLOWER FRUIT.

This species came originally from Brazil, in 1816. Botanists call it *Pàssiflora edulis*, or eatable Passion flower. Its taste is

somewhat acid—is a sort of berry; when first gathered the taste is poor; by keeping a little while it becomes agreeable to our palate. The plant is multiplied from the seeds better than otherwise.

TEA—PRICES—LONDON, 1734.

Green tea,	9 to 12	shillings per lb.
Congon,	10 to 12	do
Bohea,	10 to 12	do
Pekoe,	14 to 16	do
Imperial,	9 to 12	do
Hyson,	20 to 25	do

From two to five dollars a pound!

GUANO IN OLD TIMES—CARDAN 200 YEARS AGO.

From islands of the sea near Peru, they fetch an earth for manure. It is called guano—that is dung—not because it is the dung of sea fowls, as many would have it, but because of its admirable virtue in making plowed ground fertile. That brought from the island of Iqueyque, is of a dark gray color, like unto tobacco, ground small.

Acosta was seventeen years in Peru, and in 1604 published his "Historia Natural y moral de las Indias." He says: "In some islands or phares, joyning the coast of Peru, we see the toppes of the mountaines all white like snow, or white land. But these are heaps of dung of sea fowls—the quantity of it seems a fable. The people go for it in boats—it makes the earth yield great abundance of fruit. They call it guano, and the valleys of Peru, where it is used, is called the Limaguana."

[Journal de la Societe Imperiale et Centrale D'Horticulture. Napoleon III, Protecteur. Paris, April 1857.]

Extracts translated by Henry Meigs.

Do almonds change to peaches and then to nectarines?

This is an extremely interesting question, says Mons. K. Koch, in the Verhandlung Gewerbe Vereines, 1857.

This question has been many times discussed, and quite recently by the Gardeners' Chronicle, by Mons. Fintelmann, chief gardener of Charlottenburg.

Mons. Koch, says that the almond and peach in the covering of the nut—almond by a thin one—which as it becomes dry divides

into two parts. Secondly, in peach a thick, fleshy, succulent covering. The mode of vegetation, forms of leaves and flowers, &c., are hardly distinguishable, so little striking are these differences. We know that the more or less juicy flesh of those fruits does not constitute anything more than a relative difference. Mons Koch, says that he has seen in the East, and even in the Banat, grapes, which when ripe, had not the least flesh. We all know how different the wild pears are from those of our gardens. The pear trees of South Eastern Russia, and especially the plains of Armenia, produce small pears, more rounded and less acrid than our wild pears. They are extraordinarily hard, and almost absolutely without flesh.

The Pyrus Elœagrifolia, of Pallas; the Sinaica, of Thouin; the Amygdaliformis of Villars; the Pyranus of Rafinesque, (Cuneifolia, of Gussone,) and perhaps also the Pyrus Salvifolia, of Decandolle, which are incontestably the original sources of our cultivated pears, and are so distinguished from these rich fruits by their native dryness, (secheresse.)

To this day no man has ever found a wild peach. Even in China, it exists only as cultivated. In the Himalaya mountain region, it has simply become wild, as the loss of its name there proves. It seems therefore probable, that succulent peaches are products of culture, and not merely almonds whose mesocarp, (flesh) has become fleshy. Whenever we meet with a peach run wild, we find it's fruit nearly dry—such as those observed by Prof. Pallas in the north of the Caucasus, and reciprocally we have almonds covered with flesh! Duhamel, long ago, marked one of which Poiteaux & Turpin have given us a drawing in their new treatise on fruit trees—plate 13, of volume 1. This fruit is large enough, and occasionally one of them recalls the taste of ordinary peaches, while in other years it is absolutely worth nothing. Its yellow flesh becomes of a violet color next to the nut, which is more deeply furrowed than the almond and less than in the peach. In wet and warm seasons, it opens in two halves like the common almond—the skin of the same color on the flesh—the nut of mild flavor and taste. Duhamel says, its blossom is white; but Porteaux & Turpin, say it is of a flesh color. The

celebrated English Pomologist, Knight, regards the peach as an almond become fleshy. By hybridation he obtained a tree which, while it preserved much of its resemblance to the almond, produced fleshy fruit. But hybridation is not deemed a fair argument in this case. Mons. Fintlemann reports, that when gardener in the island of Peacocks, there were double flowering almonds, which often fruited and produced fleshy fruit, the nuts from which produced double flowering trees, whose flowers were sometimes pale and sometimes good color. Such trees are at Charlottenburg, with very insipid fruit. At any rate it must be admitted, that if peach and almond are specifically different, it is certain that they do not constitute two distinct genera. As to the other part of the question—Do the nectarines turn into peaches? Mons. Koch, says yes, without hesitation. It is true that Decandolle admitted a specific difference between them, and named the nectarine (Persia lævis) smooth peach. But there are in Italy, varieties of peaches, with hardly any down on them; and we occasionally find nectarines somewhat downy! not much however.

The history of the Nectarine, (Brugnon,) in Europe, does not ascend higher than the 16th century. Dalechamp, Matthiole and Baubin called it Nucipersica—Persian nut. The Italians call it now Pescanoce—Peach nut.

It is curious to see in Japan, this fruit cultivated, and doubtless very long ago. This fruit, originally accidentally grown, has been, like most of our fruit trees preserved and multiplied by grafting. Collinson, of England, (Westmoreland,) wrote to Linnæus, Sept. 25th, 1766, stating this to be true, categorically. He had seen large peaches growing on one branch of a tree, and on another nectarines. It is common enough to find nectarines growing on peach trees—but it is much more rare to find peaches prowing upon nectarine trees.

Richard Willis, gardener of Mr. Harris, reports that a peach tree of the variety called Chancellor, planted in 1815, first gave its fruit in 1824—produced on one branch twelve nectarines, and next year twenty-six, and in 1826, thirty-six nectarines.

We know also that sometimes one-half of a peach is nectarine; this may have been a crossing.

Collinson wrote to Linnæus, April 3d, 1741, that there was in Lord Wellington's garden, a peach tree whose fruit was these half nectarines.

Galesio, in his Pomona Italiana, gives us a drawing of the Pesco Ibrida—hybrid peach, or bizarra—awkward—one-half peach and the other nectarine. A drawing of which is given in volume 4, plate 53, by G. Fenn, Jr., in the London Gardeners' Magazine.

William Lawton, of New Rochelle, presented specimens of his blackberry vines, flower and green fruit—showing a remarkably vigorous growth, and the promise of an immense crop. Also, of his cherry currants, his crystal currants, and his gooseberries, full size—no mildew, nor have had any for many years. His black currants, from the native bushes of our mighty West, first noted by Lewis and Clark. The English black currant, which seems extremely like it—samples of the blackberry stalks of this year's growth, 2½ inches in circumference at the lower ends.

Mrs. McCready, of New Rochelle, presented a basket of noble cherry currants, raised by herself.

Charles F. Erhard, of Ravenswood, Long Island, presented a basket and a bush of his cherry currants—as large, fine and abundant as was ever seen—it seemed a mass of fruit hiding the branches of the bush. Superb product!

Henry C. Freeman, of Ravenswood, presented baskets of his very fine Brinckle raspberry, of large size; pale flesh color, fully developed and of delicious flavor.

As these Ravenswood fruits were announced as from Long Island, Mr. Robinson begged leave to hint a doubt of that fact, for it had been sufficiently proved, a long time ago, that Long Island never produced any thing; don't now, and never will, and he had suffered in consequence of giving out suspicious hints that there might by possibility be some mistake in this.

The Secretary offered to furnish affidavits that the fruits in question, actually grew on Long Island.

Mr. Robinson said nothing—shook his head—nothing can grow on Long Island, Sir! The natives have proved that long ago, to

their conviction! Yes, Mr. Chairman, they stand convicted of that.

Dr. Peck, of Long Island, rather doubted! for he had seen splendid gardens and farms there lately, and had been trying to raise a committee to go to the Desert, fifty miles from Brooklyn, and behold Mr. Wilson's magnificent clover, on fifty acres! It was a splendid field! Mr. Robinson must not shake his head at that! Besides, he knows the fact, only he is afraid to testify against the armed prejudice of the natives.

Mr. Lawton said he had discovered that gooseberries want a cool manure—that cow dung is such, and he has dug it in about his bushes—has never had mildew on them—his soil has much clay in it, and is and must be thoroughly tilled.

Dr. Smith remarked, that in England, where the gooseberry flourishes, they rarely apply manure to it.

Mr. Lawton—Some have tried the experiment of placing cups of water directly under gooseberries, to keep moist by the evaporation of the water.

Mr. Robinson—Cow dung is cool manure; it is usefully applied to wounds of plants, and animals too!

Mr. Freeman supposed that our late moist, cool spring had made our climate like that of England, well suited to the gooseberry.

Dr. Smith said that very mistaken opinions as to the climate of England, were very prevalent in the United States. We have had in our America, more snow, wet rainy weather, this year, than happens in England in two years!

Mr. Erhard said that mildew on gooseberry was scarcely known; there is something like it, occasionally, on leaves of the currant.

Mr. Robinson—Our own native gooseberries and currants, are never mildewed!

Dr. Peck—Our native wild gooseberry is of fine quality!

Mr. Lawton—The Brinckle raspberry, before us, is a noble fruit, and requires careful culture. Formerly there was a wild native raspberry on Long Island, that used to be brought to our markets; it was red, small, but of delicious flavor! What immense fields are in sight of our great city! capable of excellent crops of good things, which hardly give us any thing! lying as the Indians left

them, but without the trees. These lands might just as wéll as not be crowded and crowned with fruit! Let me mention Webster, of Paynesville, Ohio, who keeps seven acres covered with fine strawberries.

Mr. Meigs was pleased to be able to testify, that this year, our great city has been filled with fine strawberries, at a very low rate.

Mr. Freeman—My Brinkle raspberries have paid me this year, at the rate of a thousand dollars an acre!

Mr. Field gave some of his experience in the raspberry line, which was, that off 3,000 canes of them, he picked two perfect berries this season, and no more. They flowered nobly, but never filled up the fruit! Some said it was because they had not been covered up last winter! Why, sir, the labor of covering and then uncovering in the spring, and securing them to stakes or wire lines, is worth more than the berries. Our caps never want covering.

Mr. Freeman—Not so troublesome as some think. We cover the canes, which readily bend down two or three inches with earth, by means of our plows!

Mr. Robinson—There are tens of thousands of acres of our native raspberries, north of latitude 45°.

Mr. Field—Yes sir, and none of them will ever come to our markets! They are not worth the picking!

Mr. Field presented wheat stalks of good growth and good grain. Stooled thirty-one stalks from one grain, planted on pure sand, dug up below the soil many feet, without a particle of manure; but which, supplied as it has been by the unusual amount of seven inches of rain, (on the level), has flourished as you see. On a good loamy soil, the rain water ran off, while my pure sand heap swallowed up the whole of it.

Mr. E. Alvord submitted for examination his patent gutta percha and hard rubber Insulator and copper and iron tubular Lightening rods. They may be seen at 308 Broadway.

Mr. Robinson begged to be delivered from them; he felt much safer where they were not! Insulators for lightening rods! Mr. Chairman, one of the great humbugs of this great humbugging community.

Subjects for the next meeting, August 4th: "The relations of ammonia to vegetation," "Small fruits" and "Irrigation," by Mr. Robinson.

The Club then adjourned. H. MEIGS, *Secretary.*

August 4th, 1857.

Present—Mr. William Lawton, of New Rochelle, Hon. John G. Bergen, of Gowanus, Messrs. Solon Robinson, Stacey, Field, of Brooklyn, Dr. Edgar F. Peck, of Brooklyn, Mr. Antonides, of Jersey, Dr. Smith, of the *Times*, Messrs. Dowie, of Andes, Delaware county, N. Y., D. W. Davis, Olcott, Dr. Waterbury, Messrs. Wm. R. Prince, of Flushing nursery, Long Island, R. G. Pardee, and others; twenty-eight in all.

Mr. Lawton in the chair. Henry Meigs, Secretary.

The Secretary read the following translations, &c., made by him, from works received by steamers from Europe, since the last meeting, viz:

[Revue Horticole, Journal d'Horticulture Pratique, Paris, June, 1857.]

EXHIBITIONS OF FLOWERS, FRUITS, VEGETABLES, AT THE CITY OF MANS.

The exhibition, which was worthy of all praise, contained the interesting one of the pisciculturists, viz, a monumental fountain, surrounded by a jet of water, surrounded by aquatic plants. On the borders of the fountain there were thousands of Rhine salmon, salmon trouts and common trouts, eels, born and brought up in the pisciculture establishment. Ten thousand of them would not be enough for one fry. If God spares their lives, these fishes, objects of a young and interesting industry, will soon populate (stock) our streams and rivers, thus affording to our farmers a new source of profit and pleasure.

THE EXHIBITION AT VERSAILLES,

Was a happy success. We will not accuse Mons. Allviteau of having committed a criminal offence in producing green roses. But we do blame such an odd taste in collectors, for it seems to us to prefer the ugly to the beautiful. The very extraordinary

flowers of the Orchideæ and the Medinilla, with its very strange colors.

The fine specimens of dioscorea batatas, presented by Mr. Rémont, of Versailles, whose practical zeal has been rewarded with the grand prize of honor, given by the Empress.

FRUIT CONSERVATORIES.

A good one costs over 3,000 francs, ($600 or $700). The temperature must be between twelve and fourteen degrees of Reaumur, to nearly fifty-eight to sixty-one degrees of Fahrenheit. The window (only one) must be always closed perfectly tight, as well as the window shutters. Every hole and crack must be perfectly shut up, so that no mouse or even air can get in. Place moveable, vertical, wooden shafts, having as many circular shelves as convenient, and a ladder fastened to the ceiling to an iron rod, near enough for the keeper to mount the ladder with his baskets of fruits, and arrange them on these shelves, which turn by the light use of his hands. On the shelves, circular rims of tin or zinc are fixed Some days before the fruits are put in, it should be perfectly cleaned, all bad smells driven out, and floor covered with perfectly dry pine sawdust or moss. The fruits should be so placed that those which ripen first can easily be got at. The fruits should always lie on the side opposite to the color given by the sun, for that uncolored side is always less matured. Cover all with thin, light paper, to keep off dust and air. During the first days, if the weather be fine and dry, let the air in, in the middle of the day, for an hour or two. In three or four days keep them dark. As fruits always give out much humidity, and that is against their preservation, we put pieces of lime on the shelves, say four, and when these are somewhat slaked, we put on fresh bits of lime. We make use also of bottles, uncorked, having in them some five hundred grains of sulphuric acid, which has the property of attracting humidity. When saturated with the moisture, place others there.

Never enter a fruit house without a light, and when you see that flicker or likely to go out, go out yourself, and leave the door open a few moments before you re-enter. We recognize ripeness in a pear when we lightly press the skin with the thumb, and find it bend without elasticity.

[Bulletin Mensuel de la Societe Imperiale Zoologique d'Acclimation, April, 1857.]

THE CAMEL.

The two kinds, one bunched and two bunched camels, are from a comparatively narrow region. The Arabs call the central plateau of Arabia or Nedsched, the name Om el Bel, or mother of camels, and that this camel was there in a wild state one hundred years before our Saviour. From Arabia it spread gradually through Palestine, Syria, Persia, and the northwestern part of India. It is remarkable that the camel is not mentioned as existing in Africa, by any ancient author, although the connection of the Greeks and Romans with northern Africa was intimate. Strabo and Dion Cassius speak of the Moors as using horses for themselves, their provisions and baggage over the deserts, fastening the water bags of leather under the bellies of the horses. All this proves that they then had no camels, so greatly superior are they for desert travel, that they were called the ships of the desert. Cæsar, in his *De bello Africano*, chapter sixty-eight, mentions twenty-two camels found in the camp of the king Juba, in Maurritania. It is esteemed a proof that Juba had a few, but not of their employment in war or desert travel. The Egyptians never domesticated the camel. They preferred cattle, sheep, &c.

Immense caravans of the one bunch camel safely travel over ice, and in Media, over mountains, in the most severe winters, with the mercury in the Centigrade thermometers, sixteen degrees below zero, or five degrees below of Fahrenheit. And they sleep at night on the snow, their heads only being covered with a hood of felt, (say an old hat.) Nor do they suffer by the sudden changes to great heat of valleys. But he is more sensible of humidity. Moist heat often overcomes him; even kills him. The camel, as well as man, adapts (acclimates) himself far more easily in moving to the north, than in going south.

At the request of the Second Section, whose report was presented by Mons. Davelouis, and sanctioned by the Council, the prize of two thousand francs, given by M. Chagot, a member, for the domestication of the ostrich, either in Algeria or in France, is prolonged to the 31st of December, 1861. Evidence to consist of feathers taken from not less than six ostriches, of the second generation.

The committee on birds' eggs, (of foreign birds,) of which Count d'Eprémesnil is president, presented a list of the birds wanted.

Barley from the Himmalaya mountains. Quince seeds from Japan. Triple oranges, from trees forty feet high. Chinese yams, (dioscorea batatas.) Double tuberose bulbs. Seeds of variegated magnolias.

The subject of raising tea out of China, is attended to. The teas of Brazil and of Java are not esteemed as fit for commerce. Experiments are to be tried in all places which may be supposed favorable. The best tea of China, costing there but one franc a pound, now sells in Europe at very high prices. Mons. Stanislas Julien is translating all that is said about tea in the Chinese books. Mons. Chatin thinks it is too soon to decide that tea will not succeed in the mountainous districts of the south of France.

WINE FROM CHINESE SUGAR CANE—SORGHO.

Mons. Galbert has analysed it, and finds it to be much the same as cider or grape juice, possessing their properties, and good to drink.

ERINACEUS OR HEDGEHOG.

Rats and serpents are annoyances of sugar plantations, particularly the lance snake, (*Fér di Lance.*) That the hedgehog clears them out, without any trouble to himself, being perfectly armed with his thorns, and should be introduced into our West Indies.

NEW SILK.

Baron Muller, one of our members, writes from Oaxaca, Mexico, that he has found a new silk worm, subsisting on many sorts of leaves, yielding a fibre about half way between silk and cotton in its qualities, and of abundant product.

[Bulletin Mensuel de la Societe Imperiale Zoologique d'Acclimatation, Paris, June, 1857.]

From this excellent bulletin, which, with the other best periodicals, are placed on our tables free of all charge, by the government of France, we translate the following, viz:

NORMAN CATTLE WITHOUT HORNS.

By Mons. Dutrone, Honorary Counsellor of the Imperial Court at Ameins.

To the President,

Sir: Last July I took to England some of our Norman stock, without horns, and they were exhibited at the Chelmsford fair. I was introduced to the directors, Lord Portman and Sir Evelyn Denison. I found there hornless bulls and cows of the Suffolk race; very fine cattle, and the cows are among the best milkers; they make excellent butter and exquisite cheese. Among the owners, I remarked Lady Cullum, the Marquis of Bristol, Lord Stadbrook, Lord Sondes, Colonel Tomlin, Colonel Mason, Messrs. Edward Kerrison, Edward Gooch, Mosby, Ashhurst, Magendie, H. Berkbeck, Morton Pito, Bavin, and others.

In regard to ornament, this race does not shine, excepting only the splendid development of milk bag.

NOTE ON THE PRESERVATION OF THE INSECT-DESTROYING BIRDS.

At the session in May, 1857.

This society has been much occupied with this important subject, for the loss of the birds may lead to the most melancholy consequence from the destroying insects. The birds have been hunted by bird calls and nets to a disastrous amount.

After being a long time away from the district of my early life, I was surprised at the great rarity of birds now, which then abounded. The birds were not fit to eat, but a shocking habit of killing them for pleasure has prevailed; the more timid birds left the district. But the magpies had considerably increased in number. As these are very fond of the eggs of other birds, I very naturally concluded, that this was the principal cause of the destruction of the insect-eating birds. I found this to be true, and that it would be necessary to attack the magpies. They are cunning, and it is not easy to get them with the gun. Poison won't do, for we found our dogs poisoned, and some other animals. So we concluded that the best way was to destroy their eggs, as they destroyed the eggs of the little birds. I offered five centimes

for every magpie's egg, to boys. The first year I got three hundred, next year five hundred, and the third year eight hundred. The Council General of Aveyron are following this plan, which should be generally adopted.

ITALY, NEW FOREST.

Mons. Charles Siemoni, of Patro Vecchio, gives thanks to the society for the medal decreed to him. Prince Demidoff, in transmitting his letter, says, that his works, and his hospitality to visitors, are excellent. His plantations in Tuscany present a spectacle perhaps unique in all Europe. It is a virgin forest, in which are trees of eight hundred years of age; and he has beautifully clothed mountains with new trees and vegetation. Thanks to the will and perseverance of that enlightened sovereign, the Grand Duke of Tuscany, the steepest summits of the Casentino, naked almost, for ages, are now clothed with fifty millions of trees, shrubs, &c., of various kinds. This splendid work (says Mons. Siemoni) will do more honor to the memory of the Grand Duke Leopold II., than the most costly statues in marble or bronze.

The president stated, that on the 16th of May last, a male lama was born, at the Museum of Natural History, and is the product of a third generation born in France since 1846; and that we believe that it will be acclimated, and is a precious acquisition to our stock.

DIOSCOREA BATATAS.

Mons. Chevet, chairman of the committee on this subject, reports: The cultivation of this tuber in our market gardens, is sure, both on account of its abundant crop and excellent quality. Its culture is easy, requires but little care, its hardihood proved, keeps perfectly in the earth, no cold hurts it. It is very readily multiplied by seed, little bulbs, cuttings, &c. It should be planted in rows, from forty to fifty centimetres apart, (sixteen to twenty inches apart.) I have demonstrated the excellency of this tuber for our tables, for plain dishes or luxurious dishes. It cooks in half the time required by the potato, in the pot, in the oven, or under hot ashes. The poor will profit more by it than the rich.

I come to ask votes of merits, to Mons. Montigny, who sent it us from China, and to the members, who have carefully cultivated in their departments this precious plant.

The regular subject was then called up, viz: "The relations of Ammonia to Vegetation."

Dr. Waterbury observed, that when first he commenced the practice of agriculture, he was led to believe that the necessary ammonia would be furnished from the atmosphere. Leached ashes formed the only manure he employed, and yet, without green crops plowed in, or stable manure, he could never obtain good crops.

There was a close relation between the use of plaster of paris and the growth of plants. How did this arise? Farmers said that it stimulated the plants. But plants have no nerves. Liebig had explained it, by finding that the plaster of paris had become converted into chalk. It is decomposed in the soil into carbonate of lime and sulphate of ammonia.

If the fœcal matter of animals be valuable because of the ammonia, how is the alkali to be fixed? In order to effect this, different plans have been advised. The formation of a compost with earth so as to absord the ammonia, was one expedient. Others are for keeping dung-heaps dry, the field catching the ammonia as it is eliminated by decomposition. Prof. Rose, of Berlin, had shown that ammonia and carbonate would unite in as many as twelve different forms, so that the more the acid is absorbed, the less ammonia is lost in the atmosphere.

Ammonia, as is known, is a compound of nitrogen and hydrogen. No one knows how the ammonia in the atmosphere is generated. The quantity of ammonia in the rain-water of the air is an indication of the fertility of the country. In its round of circulation, the ammonia atom may be thus traced. Crude sap becomes elaborated sap, and finally albumen. In its downward track of degradation through the animal, the albumen is changed into the substance of muscle, which in turn is changed into the urea of the urine. The power or endurance of a horse is well indicated by the quantity of urea in his urine. This urea again becomes ammonia, to begin again its ascending round in the vegetable.

Sulphate of ammonia cannot be applied directly to the soil, because it is not so cheap as plaster, or, in other words, sulphate of lime.

Mr. Pardee told how that with wet plants he had succeeded wonderfully by the application of weak solutions of the sulphate of ammonia.

The sulphate of potash evidently had a marked effect in adding to the greenness and liveliness of plants. The nitrate of soda, had also in his hands proved very useful, especially in solution.

Dr. Waterbury observed, that if the nitrate of soda could be obtained cheaply enough, it would be very valuable.

The saline materials of plants are chiefly disengaged from clayey soils, especially the potash which all clays contain. Manure may be rendered inodorous by lime, but it destroys the manure, the ammonia escaping into the atmosphere. Again, ashes are not so valuable on clayey soils, because they naturally contain potash. But on a sandy soil they are more valuable.

Mr. Dowie gave an account of the treatment of some acres of surface earth from the woods in Delaware county. By deep plowing and draining with the subsoil plow, and the application of farm-yard manure—also adding 300 pounds guano to the acre, he had succeeded in producing a soil eminently fertile. Dr. Waterbury observed that a spring snow is said to be as good as a coat of manure. This arises from the absorption of ammonia from the deep layer of snow. There is also an advantage in the extreme cold of American winters, inasmuch as it prevents the decomposition during the winter of ammoniacal manures. More cannot be made of any organic matter than what it contains. Composts are useful, as they serve carefully to retain the existing ammonia. Mr. Dowie said that on the land he had treated as above stated, 125 bushels of wheat had been raised on four acres. The crop paid well for the labor. He had repeated the experiment.

The conversation then turned on the

CULTIVATION OF THE STRAWBERRY.

Mr. Prince stated that strawberries bear well near the Mississippi; the lands there are always saturated. The two points of

humidity and heat are present. Mr. Peabody uses irrigation, and Burr's new pine always bears a second crop. Strawberries may be raised here in the hot months if irrigation be not neglected. As to neat crops of strawberries, it is utterly impossible for any hermaphrodite strawberry plant to be very productive. The female plant is more so, fruit is its more particular character. A plant that has to make two sexual secretions is soon exhausted, such is the case with the hermaphrodite plant, but not with the female.

Mr. Pardee had counted 260, and in another instance 180 berries on a staminate plant, and saw many others as equally productive. It was Wilson's seedling He thought it might challenge any pistillate plant. He had always previously imagined the pistillate plant had the advantage.

Mr. Prince said if the runners be cut off and the single plant well isolated, any comparison would be fair; not otherwise. It was not just to speak of a cluster, a bunch, a dozen plants. Nature must have its course, the female plant has fewer flowers on the fruit stalk, and the strength of the plant is reserved to be developed in fruit. The plant, of which Mr. Pardee had spoken, was staminate, and is an excellent plant, (Wilson's), yet it was the character of a staminate plant to throw off many blossoms and produce comparatively less fruit. They require expensive culture, as single plants. Pistillate were the only class fit for market culture. They might be allowed to run together by the acre. The "Crimson Cone," which chiefly supplies New-York, was a pistillate plant. The staminate plants might be planted anywhere. The sexuality of plants, especially of the strawberry, was important. Linnæus had said that all strawberrys are hermaphrodite. But he spoke only of two European varieties. All the large strawberries now in Europe are chiefly from Virginia and Chili. The varieties Linnæus knew were both hermaphrodite. It had been said that change of sex in plants might be effected by artificial process, as by warmth. This idea was erroneous and absurd.

Mr. Pardee would not argue against theories. But how was the productiveness of the staminate Wilson's seedling to be accounted for? Outbearing by four times, the best pistillate?

Mr. Prince said that it was the runners that produced the exhaustion. The fair test was the weight of the berries in two cases. This talk about a multitude of blossoms was of no value. The plant might produce a profusion of little berries.

Mr. Pardee said that Wilson's Seedling is larger than the Crimson Cone, and as solid and heavy; and, besides, the runners on these Wilson's Seedlings had not been cut off, but allowed to run freely, and form plants all the previous season. So that the test (as far as a single test can be) is a fair one.

The chairman asked whether the cultivation of the Alpine strawberry was abandoned.

Mr. Prince said that the markets of Paris are furnished exclusively from the Alpine strawberry, which is produced from plants that are sown in April and May. It is prone to produce fruit perpetually.

THE POTATO ROT.

Mr. Bergen exhibited some potatoes affected with rot. He stated that the disease is prevailing very generally in Kings county, and also in New Jersey. He had dug 190 bushels from three-fourths of an acre, and of these one-fifth were rotten. The soil was sandy loam. The potato vines have shown evidence of disease very rapidly during the past fortnight. No rot has been visible of any consequence until the heavy rains of last week. This is contrary to what happened two years ago, when the rot succeeded the rains, and on the appearance of dry weather.

Mr. Field thought there was no great dissimilarity. The fact was, that the rot could not appear until the tuber had obtained a certain maturity.

Mr. Bergen did not agree with that view of the subject.

Mr. Field had 20,000 young pear trees struck with the rust. They had almost entirely lost their leaves.

The Chairman adverted to the purity of the vegetation. This year, in New-Rochelle, up to this date, there were very few insects. The potato vines were healthy. It was strange that in this locality, the neighborhood of New-York, it should be otherwise.

Mr. Bergen—Some of my cucumbers are struck with rust.

Chairman—I never witnessed such splended vegetation as that around me! It is glorious! Not insects enough to feed our little birds. No worms' nests to be seen, no blemish visible on any plant.

Messrs. Pierce and Haskin exhibited a new patent churn. It operates much like the propeller in water. The effect in making butter said to be excellent.

Wm. R. Prince, of the Flushing nursery, sends bowls of his cherry currants and large white provence, with its silver edged leaves, and some of his large raspberries. The large crystal currant, with its silvery edged leaf. The provence is a charming variety. Also a bouquet of rare flowers from his gardens. Mr. Prince has many thousands of the dioscorea batatas growing well. The plant requires sandy soil.

Questions for next meeting: "The potato," and "small fruits."

The Club then adjourned to Tuesday, August 18, at noon.

H. MEIGS, *Secretary.*

August 18*th*, 1857.

Present—Messrs. William Lawton, of New Rochelle, and Adrian Bergen, of Gowanus, Long Island, Dr. Underhill, of Croton Point, Messrs. R. G. Pardee and Ehlers, Judge Harris, Mr. Scoville, Dr. Waterbury, Messrs. Solon Robinson and Davis, Dr. Smith, Messrs. Hite of Morrisania, Joshua L. Pell, John W. Chambers, and others; forty-one members.

Mr. Lawton in the chair. Henry Meigs, Secretary.

[The Journal of Agriculture, and the Transactions of the Highland and Agricultural Society of Scotland.]

Extracts by H. Meigs.

FISH BREEDING, (*Pisciculture.*)

Salmon fry leaving a river in April or May, will certainly return to it in myriads in about from fifty to sixty days, and so astonishingly grown, as to be a coveted article of human food. We repeat, that the result of the experiment at Stormontfield has proved, that salmon fit for market can be artificially raised within twenty months after the deposition of the ova. That it will prove

a remunerating speculation to the English Salmon Fishery Company, on the beautiful little river Dart, in Devonshire.

The experiment in Perthshire, in demonstrating Mr. Shaw's experiments, show, on the sea trout, the following: He cut off the adipose fin of 524 of them, in the summer of 1834; in 1835 he recaptured 68 of them, averaging two and a half pounds' weight. On these he put a second distinctive mark, and returned them to the river. In 1836 he recaptured about one in twenty of them, and they averaged four pounds weight. Marking these the third time, he returned them to the river. On the 23d of August, 1857, he recaptured one of them weighing six pounds.

1st. Of the marked salmon at the Stormontfield pond, four per cent. were recaptured either as grisle or salmon.

2d. More than 300,000 were reared and liberated, and forty out of every thousand were recaptured. Hence twelve thousand of the salmon taken in the river Tay were the pond bred fish.

3d. The annual average of salmon and grisle taken in the Tay, is seventy thousand. So that during the last two years, nearly a tenth part were artificially bred.

We desire to impress upon all persons living near canal, lake or stream, that by transporting there the ova of fish, any body of water can be stocked with valuable kinds of fish. A great field is opening for fish.

At Stormontfield, the apparatus for breeding is rather cumbrous. But the one patented by Boccius, which contains twenty-five thousand salmon ova, is onlv two feet long, by one foot broad, and requires but four inches depth of water.

Dr. Esdaile suggests dispensing with both boxes and gravel, depositing each egg in a little cup, punched in a plate of zinc, or in a slab of coarse stone ware. Why not of strong, coarse glass, cheap, in which small hollows can be easily made for each ovam? He calculates that twenty thousand ova can, at a small expense, be deposited in about three feet square.

We advise an examination of the apparatus used by M. Coste.

At the late exhibition in the Champs Elysees, Paris, there were among other things, an interesting one of artificially bred fish—

showing their growth from year to year. Salmon, from the river Danube, trout, from the lakes of Switzerland, and graylings, from Lake Constance. These last were hatched this spring. The salmon and trout, are (at fourteen months old,) from 4½ inches to 16½ inches in length. There are two salmon, three years old, one of which is nearly 19 inches long by 13 inches in circumference. A young salmon of four inches long, and weighing about four ounces, when permitted to go to the ocean, returns to the rivers in about six weeks, weighing from five to six pounds weight. Naturally, a salmon grows in three years to about 25 pounds weight. Artificially, he only gains at the Thuringen establishment, about five pounds weight.

[Journal de la Societe Imperiale et Centrale D'Horticulture. Paris, June, 1857.]

Extracts translated by H. Meigs.

NEW APPLICATION OF ELECTRO MAGNETISM TO HORTICULTURE.

Mons. Becquerel, of the Institute, reports, that being charged by the Society of Horticulture with the examination of what has been done relative to an electro-magnetic apparatus, contrived to regulate the temperature in cocooneries, and hot houses, &c., in order to have a steady uniform state of it, independent of windows and doors, by means of a breathing hole, (soupirail,) to open and shut by means of an ingenious electro-magnetic apparatus, which operates as the interior temperature rises or falls.

I think that the extent of the force, as applied, is not sufficient even for hot houses or cocooneries of common dimensions. The project of Mons. Carbonnier, is a rational one. I ought to remark here, that electricity may be usefully employed; not as a force, but as the means of transmitting force.

Report upon the elementary treatise of Mushrooms, eatable or poisonous, by Mons. Dupuis, professor of forest culture, in the school of Grignon—by Dr. Boisduval.

You have charged me to give an account of this work, and I comply. The title indicates it to be, not a general work on the innumerable family of mushroooms, but a special treatise, showing the difference between the eatable and the poisonous kinds.

The author makes two distinct parts of his subject. First, he gives the organization of the mushroom, its vegetation, its chemical composition, properties and uses, the general distinguishing characters of the eatable and the poisonous, the mode of keeping the good sorts, the culture of them in beds, the attempts to cultivate the truffle, how to cure those who are poisoned by mushrooms. Mons. Dupuis has, we hasten to say, drawn on the best sources of knowledge: from Bulliard, Parmentier, Persoon, Richard, Roques, Cordier, Mougeot, Schœffer, Leveille, &c. As to its chemical composition, he has proved equal learning. He quotes the analyses of Vauquelin, Braconnot, Schlossberger, Dopping, Tripier and Letellier, without forgetting what has been written upon this subject, by our learned and honorable President, Mons. Payen.

That chapter of this work which we consider the most important in his book, is that on the distinguishing characters between the good and the bad. They are characteristics easy to learn: Smell, taste, color, consistence, *habitat*, place of growth, age, &c. In his second part, he carefully describes the good and the bad; and in doubtful cases, where the mushroom has a fallacious aspect, he gives good drawings of them, side by side—the false oronge and the true, the poisonous Amanite with the eatable Agaric.

We believe that Mons. Dupuis has, by this work, rendered a true service to society. It is a small manual, within everybody's reach. We hope he will continue his observations on mycology, and give us the causes of the developement of those vegetable leprosies, whose dust or spores, invade all vegetable tissues, and rapidly destroy the hopes of the cultivator.

DISEASE IN PEAR.

Mr. Field spoke of a rust which had attacked his large pear nursery, (20,000 trees,) on the 4th of August instant.

Judge Livingston has the same on his estate in Dutchess Co.

Mons. Vuitry, of Saint Donain par Montereaux, speaks of it thus:

"I send a box of leaves and knotted fruit—the Pear Beurré d'Aremberg, an espalier, a few days ago, remarkable for the vigor and abundance of its flowers—is now destroyed. The leaves are spotted; the pear covered with a light white down, like the

Oidium; they fall off one after another. Mons. Ballai, finds the same disease in his. It is a sort of cloque or rust. He is throwing sulphur over them."

[Bulletin Mensuel De La Societe Imperiale Zoologique D'Acclimatation, April, 1857.]

Translated by Henry Meigs.

THE POTATO.—(*By Mons. D'Ivernois.*)

To the Imperial Society—

Gentlemen: I have been for many years struck with the degeneracy of this precious plant. I have grown potatoes on a large scale, here at Hyeres, in the vicinity of the town, department of the Var.

The potato has never been attacked here by the malady, so called; but it has always escaped by being very early, for we dig up our crop in June, at which period they usually begin to be attacked. But, nevertheless, our potatoes are not sound or vigorous, for in spite of all our care and the best modes of cultivation, we can hardly find on many hectares of our best soil, covered with potatoes, two potato vines bearing seed balls with fruitful seeds in them.

This very serious fact is not peculiar to our lands, but has manifested itself in the most different climates and lands. So that our malady is not peculiar at all to Hyeres, but is a general characteristic of the potato everywhere. Besides the extraordinary fact of its loss of power to produce good seed, it is unhappily no longer as good as it used to be. It is degenerated.

And when we behold a plant which covers more than a million hectares of France, which feeds, or did feed one-sixth part of our people, (5,000,000,) we feel the most profound interest in the discovery of remedy

I have dared to express an opinion as to the causes of this evil. That we must look to seed for a regeneration. The tubers are no more than agglomerations of abortive buds, the developement of which indicates, to a certain degree, feebleness of the plant. I have tried the best kinds of potatoes for seed, without valuable results. Fatigne with unsuccessful trials. I sent for the originals, from Santa Martha, in New Grenada, South America, and received a quantity of potatoes in good order. I planted them

last March; the spring has been deplorable for vegetation, (spring of '56,) all the plants suffered. My American potatoes, however, produced superb plants, incomparably more vigorous than any others, and gave me twelve for one—a great yield for so bad a season. They were above the medium size, handsome and of good quality.

I kept them all, have planted them this spring, and I am impatient to see the result of this second generation. Nothing deserves your attention more than the re-acclimation of the potato. Perhaps this precious plant, taken anew from its native land—the high plateaux of the Cordilleras' of the Andes, near Santa-Fé-de-Bogota—may again restore to Europe, its original powers of production.

These views of Mr. D'Ivernois, were approved by many members, and Mons. Drouin de L'Huys, Vice-President, Mons. Moquin Tandon, and Mons. Cosson, were charged with the project of importation of the original potatoes, on a sufficiently large scale.

CERFEUIL BULBEUX.

This plant is one of the apiaceæ, of Lindley. The ancients used to grow it as we do celery.

"This bulbous chervil is new, and we call your attention to it. Linnæus called it *Chærophy llum bulbosum*; is found in many parts of Europe, and seems very appropriate to Alsace. It has long been used in Hungary, and in some parts of Germany, for food. It was presented to us(France) in 1842. Mons. Vilmorin did not admire it, but you, gentlemen, who have tasted it, can say that there is hardly one vegetable on our tables of a finer, sweeter and more agreeable relish. It is one of the most digestible of vegetables. The bulbs vary in size. Mons. Vivet, in 1856, raised them of the weight of two hundred grammes, and more, each. They resemble our early short carrots in form. They grow well in almost every soil; want manure, and love lands that are not too dry. We take the seeds as soon as they ripen, in the last of August or in September, and sow them. If sown in the spring, they do nothing that year. It may be sown broad-cast, and harrowed in lightly. Must not be sown too thick. Cultivate it in

any way, as you do carrots. They are fit to raise in July, or a little later, when their leaves are not all dead. The bulbs are kept much as carrots are. One of them set out gives seed enough for ten are, or about a quarter of an acre. You must never let chervil follow celery. No vegetable cooks quicker; a few minutes do it. It may be served in all the ways in which potato is.

Chemical analysis shows it to contain upwards of eighteen per cent of starch; while the very best potato gives but fourteen to sixteen per cent; and it is more nutritious than potato, as three is to two. The crop can be made to weigh about 37,000 pounds a hectare, equal to about 15,000 per acre; say seven tons weight.

Mons. Vivet has received medals from many societies for his new bulbs.

JAVA TEAS.

Mons. Chatin examined these, and reports them inferior. The best of them being only equal to second quality Chinese. Tea has not yet succeeded in Algeria, but Dr. Cosson thinks it may do in the mountainous parts.

[Revue Horticole, June, 1857, Paris.]

EXHIBITION BY THE IMPERIAL AND CENTRAL SOCIETY OF HORTICULTURE.

It occupied the nave of the Palace of Industry, and all the southern portion of the lower galleries. Opened on the 20th of May, and continued to the 7th of June. After the 20th of June, when the exhibition of the fine arts takes place, another one of the plants and flowers will take place. The body of the palace appeared like a park in miniature, with its large trees, masses of rare shrubs and bushes. Flowers of the richest colors; its green turfs; its thickets or groves of choice trees; its walks beautifully sanded with river sand; and its river, a true river, more than two metres wide, sometimes boiling and rapid, then calm and deep; its borders covered with flowers, shaded by the trees, quite rocky in places, meandering through the trees and flowers; a rustic bridge over it, from which the visitor beholds on its banks, a ravishing view, one of the most delicious; plenty of orange trees on both banks of the river.

The American Azaleas were very beautiful. Those from the gardens of the Baron Rothschild were fine in growth, but had been cut into too regular shapes to be pleasing. Vast and superb collections of Pelargoniums; very rich Pensées (violets), Pansies, and admirable Calceolarias, great for variety and beauty. Very fine, but no many, roses. The Orchideæ of Messrs. Thebaud and Ketéleer, and of M. Leon Le Geray, were brilliant and of admirable culture. Among them we noted the Saccolabium guttatum, a grand specimen, bearing five long bunches, thirty centimetres (a foot) long, of beautiful red flowers. Others, with sixteen large white flowers. The admiration of the public was excited by the Bylantium Antharcticum, a fern, from New Zealand. It is a tree fern. We had the Bread tree, (the Garcinia Gutta,) furnishing the gum drop; the Isonandra gutta, (the gutta percha;) the Salactrodennron utile, (milk tree;) the Ipecac and Quinine; the beautiful Rhododendron Dalusiæ, from the Himmalaya mountains.

Among the vegetables, we saw there a beautiful collection of the dioscorea batatas, Chinese yam, from Mr. Rémont, of Versailles, and of M. Courtois Gerard, and of M. Limet, and his bulbous cheroils. From the garden of Mons. De Rothschild, rich, ripe prunes, figs, delicious peaches, Chasselas grapes, strawberries and raspberries. There was also a fine collection of the productions of Algeria, from the Minister of War.

THE POTATO DISEASE IN THIS COUNTRY.

This having been adopted at the last meeting of the Club as one of the questions for discussion at this meeting, was now called up, and elicited a very spirited and interesting discussion, of which we can only give a few facts.

Mr. A. Bergen, of Long Island, said that the alarm prevailing two weeks ago about the potato rot is somewhat abating. There is something very mysterious about the spread of this disease. In some fields it is twice as bad as in the next field, with only a fence between, and both fields treated alike. I think the manure affects the disease; it is lightest in the poorest sandy soil. Growing potatoes is not encouraging. We cannot raise good crops on poor land; and if we make it rich the tubers rot. It is equally

difficult to grow oats upon our well manured soil, on account of their tendency to lodge I have a field now so fallen that men I have hired to cut them have given up quite discouraged. They can only be cut by pulling them up with the point of the sythe. We subsequently inquired of Mr. Bergen if he used lime on his land, and found that he did not, and have no doubt if he did that he would find his oats grow with as stiff a stem as a bunch exhibited from Patchogue, L. I., the stalks of which were as large as pipe stems and strong enough to support a remarkably heavy head.

Dr. Underhill, of Croton Point—I never have had any rot in my potatoes, and I have grown them from seed grown many years upon the same ground. Some of the tops of the Mercer potatoes have been killed. The Western Reds of the long variety are never affected. My potato land has all been dressed with swamp muck, in which there is a good deal of sulphate of iron (copperas) and tannic acid. I have put upon less than 100 acres of dry, sandy soil, 30,000 loads of alluvial deposit. I think the Mercer and kidney potatoes much more inclined to rot than any other kind.

Mr. Bergen said that on Long Island the Mercers rot worse than any other kind, and are the sort mostly cultivated.

The Chairman said, upon his ground, he had observed the same sort of potatoes badly diseased in one part, and healthy in another spot only a few feet distant. His soil contains sulphate of iron where he grew potatoes.

Mr. Pardee—I have noticed that it is thought that the newest kinds of potatoes are most free from disease. In this State, when the rot first appeared, it affected all the old kinds alike. One man had sown seed of a fine, white table potato, derived from Mexican seed, which it was then said never had rotted. It has now been extensively cultivated, and I do not know that it has ever been affected. Some of the new potatoes produced by Mr. Goodrich, of Utica, are very superior in quality, and are certainly much less likely to rot than the older varieties.

Solon Robinson related an anecdote about his experience with a new variety of potato, said to be proof against the rot. About

sixteen years ago he lived in Indiana, where the potato rot had not appeared, though it was feared and expected; and as our potatoes were all of the Mercer or Neshanneck variety, which it was said were much more liable than any other to the alarming disease, and therefore it was a great object to get a kind that not rot; and as the Carter potatoes, a newly originated variety, were said to be that very kind, he procured and took some of them for seed to Indiana, and every one of them rotted, and no other near them, and that was the first of the disease in that region. This is a simple fact, but what does it prove? Simply that no sort, new or old, is free from disease.

The Chairman—The phenomena of this disease in potatoes and other vegetables are strange. They not only excite an eager inquiry, but that search in vain for cause and remedy, has become wonder! All the supposed causes have existed from the beginning of the vegetable and animal kingdom, and without any disease fatal to whole classes. Among the large trees, sycamore seems to have been most severely and generally attacked; still, it survives! There is not an approach to a cure for the malady yet.

Solon Robinson—To prevent any alarm upon this point, about the potato running out and being lost to the world, and the advantage of resorting to original sources for a preventive, I will relate a little of my experience. As to the kind of potato spoken of by Dr. Underhill as possessing so much new vigor as to be proof against the disease, it is one of the oldest sorts in the country. About the necessity of going back to the cow for fresh vaccine matter, I have to say that I was most thoroughly vaccinated by milking, direct from the original source, and afterward had the small-pox about as hard as any man ever did and live. Still, I approve of new experiments and new trials, but have no faith in getting rid of the potato rot by getting new varieties. I trust, in time, it will pass away.

SMALL FRUITS.

This subject was now called up by Mr. Pardee, for the purpose of getting Dr. Underhill to give the Club a few plain practical

hints about his specialty, grape culture; but after a most persevering effort to draw out a single thing that would be useful to others, he gave up in despair. We heard several members say that the only inference they could draw from what he did say was that he would not recommend any one to try to grow vines from layers or cuttings, but always to procure young plants with roots, because he kept roots to sell. He did say the best manure for vines is vegetable mould and bones, and that cuttings should only be cut from bearing buds, and not planted deep, and only on well drained land.

PROGRESS OF THE CHOLERA.

Mr. Meigs thought, that so far as experience has now gone, the cholera in men, has evinced a similarity in animals and vegetables, too striking to be overlooked. He has not always been fortunate in life, for he had yellow fever twice in Georgia, in the first two years in this century; and in Philadelphia, in the yellow fever of 1805; and moreover, was sent to the Legislature of New-York, in 1818; to the sixteenth Congress, in 1819 and 1820; and to the Board of Aldermen of New-York, in 1831; and, in 1832, being president of the board, he officially was one of the board of health. Rumors of cholera advancing from the east, he used all his resources and labors, and some public money, in gathering all possible knowledge of the fearful enemy. He visited the low, dirty parts of the city; found, in the Fifth ward, a horrible building, about one hundred feet long by twelve deep, filled in by two hundred and four of the lowest population. Had it limed and cleared as much as possible, expecting cholera to kill them by wholesale. He visited the celebrated Five Points, during the height of the cholera, where, instead of the sad countenance in all parts of the city, he found the people in numbers crawled out of their damp cellars, with ceilings as high as the between decks of a privateer—with pots and kettles on tripods or stones, cooking the worst meat, with stale corn, turnips, cabbages, &c., and yellow, large cucumbers, with overgrown green ones, pickled in vitriolized vinegar—laughing, joking, in a manner unknown utterly to the clean parts and clean inhabitants of the city. And why is it necessary to

suppose filth is unhealthy? A flash of lightning is not filthy. The poisons, many of them, are as beautiful as the colors of the rainbow. We watched the progress of that cholera. My brother, Dr. Charles Meigs, of Philadelphia, and my brother alderman, Dr. Rhinelander, volunteered to meet the cholera on its arrival at Montreal. They did meet it, and however confident they and we were that we could find it out, the more we busied ourselves, the deeper we sank into profound ignorance. Our maps of the course of the cholera, published in Boston, in 1832, (in our library,) by the Massachusetts Medical Society, show the starting point to have been, in August and October, 1823, from the islands of Amboyna and Banda, east of Celebes, which lies east of Borneo, at a moderate distance. The track of the cholera is marked like a streak of lightning, with red. It went around southerly of Borneo, and struck Singapore, the most southerly point of the peninsula of Malacca, whence it parted, and going one red streak northerly, touched Bankok and Siam, in the bight of the gulf of Siam; the other streak going rather westerly and north-westerly, struck the little island of Pinang, at the north-western end of the straits of Malacca; and after leaving Pinang, it returned, at an angle of about fifty degrees, and struck Acheen, on the north-west end of Sumatra. From the point of return, it moved nearly in a straight line north by west, several hundred miles. It had started from Manilla, October 5th, 1830, and moved south-westerly almost straight for Singapore, and thence northerly to Bankok; thence south-easterly, to Cambodia; thence down to the cape; thence by a curved coast line northerly, to Tonquin. From Macao, a new point of departure, it reached Nankin and Pekin, its then most northern travel, latitude forty. From Sumatra it struck Rangoon, in latitude seventeen degrees thirty minutes, about, not touching Pegu, a large city a few miles east of Rangoon, and penetrated some five hundred miles to the south-westerly part of China. In its travel from Acheen, it struck Jessore and Calcutta, in the bight of Bengal bay, scattered in all directions, a little north-east to Sithet, all down the easterly coast of Hindostan visiting every place on that route all the way to Cape Comorin,

the south end of Hindostan; hence it leaped to Ceylon, and from Ceylon south-westerly, some thousands of miles, to the two islands of France and Bourbon, near Madagascar. After traversing Hindostan in all directions, it cut across the sea of Arabia, to Muscat, in June, 1831; whence one line moved north-westerly along the Persian gulf to Bassora and Bagdad, to Damascus and Aleppo, on the Mediterranean. The other line, from Muscat, traveled more northerly, to Shiraz, Ispahan, Teheràn, in 1822, and along the west coast of the Caspian sea up to Astrachan, where it was from 1823 to 1830; thence scattering through Russia all the way to St. Petersburg, latitude sixty; thence to Stettin, Dantzic and Hamburgh, touching nothing more south-westerly than Vienna. From Hamburgh it crossed over and struck New Castle and Edinburgh, ran down to London, crossed over to Ireland. Now, while westerly march of several thousand miles was going on, another red streak left Delhi, ran to Lahore; thence to Cabul; thence, by a northerly line curving to the westward, it struck Orenburg, September, 1829. Here this streak of cholera lightning stopped, while the other one came over to Canada, in 1832.

In its course through the region of the Ganges, as it approached the large city of Moorshedabad, on that river, a vast population, land low, moist, heat excessive, all dead animals left to rot in the streets; many *soi disant* wise men cried woe! woe! to Moorshedabad, and waited to hear of havoc among her people. They deceived themselves. Cholera came near it, but jumped clear over it, to some beautiful high grounds north-westerly of the filthy city, and slew those good people who turned up, or rather held, their noses at Moorshedabad.

After reaching Edinburgh, it made a nearly direct line for London, where it struck, February 12th, 1832. Whence it ran off north-west, to Glasgow, and more westerly, to Dublin.

I had the means and leisure to read all that has been written about it, have had it myself, and examined several of the most extraordinary cases in my (Ninth) ward hospital, in 1832; and I leave off in perfect ignorance of its cause and remedy. It usually, as in the vegetable world, selects individuals, or sometimes masses, never the whole.

In examining all that has been written on the malady of the potato, grape, and many other plants, we mark the same curious varieties of action as in men. One said, your potato rotted because it was planted in a valley, on a hill, in clay, sand, loam, too much, too little manure; too early, too late; on the south side, while the north is all good; on the north side rotten, sound on the south, a common rail fence divided the rotten from the sound. In the same field, alternate irregular numbers rotten and the others sound; too much wet, too dry, too hot, too cool, &c., &c., to the end of all the thousand and one chapters on this vegetable plague, leaving us on the under side of the wheel of knowledge, which we have climbed with the assiduity of a wilderness of squirrels, and finding ourselves, like them, where Hudibras put his philosopher, two hundred years ago—

"At the place where at his setting out he was."

Most enquirers have, however, reached one conclusion, viz, *that the disease, and not the potato, will one day run out.*

Mr. Lawton presented to the Club baskets of his magnificent blackberries, measuring (the largest) nearly five inches by four and a half in circumference.

Mr. Hite, of Morrisania, presented some of the same stock, about the same size.

Mr. Brett presented, from his farm at Patchogue, Long Island, oats, of great weight, and of seventy bushels per acre.

Solon Robinson wonders how such stories of that down-trodden (by itself) soil can be believed. But he says, there are plenty more like it, that are true; let who will testify against that noble island.

Subjects for next meeting: "The small fruits," and "Irrigation."

The Club then adjourned. H. MEIGS, *Secretary.*

September 1, 1857.

Present—Messrs. Lawton, Davis, Robinson, Dr. Smith, Field, Adrian Bergen, three ladies, S. D. Bloodgood, Doughty, of Jersey, Prof. Mapes, Dr. Waterbury, Gail Borden, Jr., of Texas, Mr. Stewart, Mr. Stacy and others—between forty and fifty.

William Lawton, of New Rochelle, in the chair. Henry Meigs, Secretary.

The Secretary read the following translations, &c., made by him from abroad, since the last meeting, viz:

[Journal De La Société Impériale et Centrale D'Horticulture. Paris, June, 1857.

Extracts translated by Henry Meigs.

HORTICULTURAL EXCURSION INTO GERMANY.

By Lepire, the son.

Last March, the Count Hahn, hereditary marshal of Meklenburgh Schwerin, engaged me to see what could be done with his fruit trees. That portion of the Germanic States is one of the richest of them. Cultivation on the large scale is carried to the highest degree of perfection; the country is magnificent, and the grain crops are superb.

ON THE TRIMMING OF THE HEADS OF YOUNG FRUIT TREES ON TRANSPLANTATION.

By Mr. John Schamal (*Verhandg des Vereines zur Beförd d Gartenbans*, 1857.)

This question has been a long time agitated, and not yet decided. It is an important one; agricultural and horticultural societies, have many times made it a subject of discussion.

Mr. Schamal says, that for twenty-five years he has possessed a nursery of more than ten acres, and has constantly sought for the best manner of treating young trees at setting them out, and has at last taken to the following method. He transplants every tree three times, while they are young. The result of this is the formation of a great quantity of roots, and these contribute powerfully to the increase of vigor in the future tree. When any roots are torn in the transplanting, he cuts off neat, with a sharp knife the wounded parts, he suppresses nearly all the root fibres. He cuts off the head, so as to be in analogy with the roots, preserving three or four branches only, but occasionally more, all cut to about a finger's length from the trunk; sometimes cut all off except the centre one. These few branches, from three or four eyes develop with the first sap, shoots remarkable for their length and vigor. Seven hundred apple and pear trees treated so, all flourish; not one has failed.

ON THE PROPER TIME FOR TRANSPLANTING FRUIT TREES.

By Mr. Charles Fischer, (Monatschrift fur Pomologie.)

It is nearly certain, from a large number of observations, that the roots of trees take their principal development and growth when the autumn begins the natural arrest of vegetation in the parts of the tree above ground. Mr. Fischer noticed this particularly in various kinds of prune trees. When the first frosts kill the leaves, the sap thickens and ceases to circulate in the parts above ground, but is still fluid, and active in the parts below. The roots cannot send it to the tree any longer.

On these facts, Mr. Fischer has for fifteen years past based his practice in transplanting young fruit trees, from the end of August, in all September, whenever the leaves have fallen; if a tree still has fresh leaves on, he lets it stand till they drop off. He has succeeded beyond his hopes. Very few have failed, and all the rest next spring, grow as vigorously as if they had not been transplanted. They must be transplanted carefully, of course, as well as suitably watered well.

Mr. Schamal has tried another experiment, and that is, cutting off all the leaves down to their petioles or foot stalks, for then the transpiration of the tree is arrested, for the leaves are the essential organ of it. A very natural consequence of this is, that the young tree cannot dissipate its sap, which would be a mere loss, for it is necessary to its growth, and on being transplanted, some time elapses before the roots can supply the tree with any sap.

When the petioles begin to drop off, we know that the sap from the roots has begun to rise—then the success of the tree is certain. From a great number of experiments, Mr. Schamal has found that the new growth in such trees is rapid. In about eight days the petioles clearly indicate this; shortly they lose all adherence to the tree and fall off, or come off on the slightest touch, and the eyes show signs of growth, remarkably. It is best to move the trees in the last of August, or in September, because the days are long and the roots will have time left to take hold before cold weather comes, and they stand winter the better for having taken, and grow better in the ensuing spring. And besides, it is well

known that when set out in spring, the trees grow slowly and feebly while they are waiting for their second sap.

PECULIAR MODE OF CULTIVATING POTATOES.

By Mr. Orbelin.

I have been asked about this mode, which is practised by the gardener of Mr. Drouin de Saint Maur, whose remarkably successful products I have often presented for exhibition.

The potato he cultivates goes by the name of yam. His practice differs much from the general method. He prepares the ground well, and then makes little furrows in it about ten centimetres (four inches,) deep, just as he would for sowing peas. He then from a potato scoops out an eye, the germ having a little of the potato about it—these he sets in the furrows by hand. When the plant comes up and shows several stalks, he takes all off but the strongest.

Drainage has been practised for a long time; the old-fashioned large ditches displaced by the system of tubes, heralded so much in England and France by all the really intelligent agronomes, for many years past.

Their sandy soils are rendered fertile by the yellow flower Lupin, (Lupinus lûteus,) which not only ameliorates the soil surprisingly, but feeds their sheep.

The great men, the savans, all the first men of Germany, are now, not only amateurs but practicians of gardening and farming. The count, Albert Schlippenbach, a chamberlain of the King of Prussia, showed some of his works, which I think are some of the finest I ever saw. At Counts Arnem and Bapevich, I saw all the new flowers from the four-quarters of the globe.

The Count Pliesse, showed me his old oaks, contemporaries of Varus and Arminius, eleven and thirteen metres in circumference, more than forty feet. (Arminius and Varus flourished 1860 years ago.

Every instructed man in Germany loves flowers. Children learn botany at their schools. They have herbariums. They cultivate flowers everywhere. All the windows of cities and villages are like so many hot-houses full of beautiful flowers. The men of high station all grow pine apples &c.

[Bulletin Mensuel de la Societe Imperiale Zoologique d'Acclimatation, Paris, July, 1857.

THE OSTRICH.

Report by Doctor L. A. Gosse, on the several statements from Oran, Tiaret, Sebdon, Tlemsen, Algiers, Boghar, Laghouat, Tebessa, and from tribes of Arabs south of Algeria, along the northern boundary of the vast sandy desert of Sahara.

The ostriches move to the southward when the rainy season sets in; if the weather is cool, or it is time to lay their eggs, they move off to the warmer parts southerly. All the Saharian ostriches are of one race. Their stature is smaller than others. They never exceed about five feet in height, from the bottom of the foot to the top of the back. The neck is nearly as much more. The body nearly three feet long, by two and three-quarters broad. When hatched they are about the size of our partridges. At eighteen months old they are three feet high. Entire black ones are very scarce in Algeria. South of Oran they are occasionally found. The life of an ostrich is believed to be, by some men, seven to ten years; others say twelve to fifteen; others, seventy; and at Tlemsen, one hundred.

Some think that there are more males than females. In a covey, Lebdon, two-third males; Boghar, two-third females; Tlemsen, the males less; Tebessa, three males to ten females. The question of their monogamy and polygamy is argued still by Sebdon. Monogamy in the wild state. From fall to spring is love season with them here. If the season has not been fertile, love begins about the end of winter. In love he is bad tempered. The natives sometimes have to defend themselves with stones, sticks, and even guns. And they fight one another.

Thirty or forty of them, of both sexes, make up a troop. At this season these separate; each male chooses from one to three females, and goes off with them. This family live together all winter. They choose their nests in sandy places, or in low ones; never on high ground. They remove all pebbles from the hollow, because they might break their eggs or hurt the young ones. This nest is oval, more or less perfect; a sort of a ditch outside protects it from water. Then they couple, and the female runs to the ready-made nest, and stays on till night. The egg shell is hard when first laid. Next day they couple with the second

female, and she deposits another egg in the same nest. Next day the third female does the like. Then the first female couples and puts in another egg, then the second, then the third; always in this order. So that each lays from fourteen to twenty eggs. It is said that each female puts her eggs together in the nest. The male sits on them every night. When the nest is full of eggs, and there is no room for the rest, they arrange the surplus ones in the ditch, in symmetrical order. They never put one egg on another. If the ostrich happens to break one of the inside eggs, she replaces it with one from the ditch outside. As soon as a young one leaves the shell, the old one makes a hole in a surplus egg for it to feed on. They cover the eggs with body and wings. The eggs will keep from one to two months sound. The female lays between the first and second year of her life. All accounts agree that they sit on the eggs all day and all night until they are hatched.

The length of the time of incubation is left uncertain; the eggs and the sand about them are very hot. Some accounts say that when ostriches are domesticated, they never lay; others say they do. Observations made at the ksours of Oulad, Sidi, Chikh, where a great number of ostriches, of both sexes, have been raised in a domestic condition. Si Djellout Ban Hanza asserts that he saw, at Marakac, the capital of Morocco, in a park belonging to the palace of Mouley Abder Rahman, numerous ostriches which coupled and set and raised young ones just as they do when wild. All reports agree as to the facility with which the ostrich is fed. Here follows a list of plants, and besides, like turkeys, they devour grasshoppers. They also like rats, snails, snakes, lizards and jerboas, and they fatten on the grasshoppers. In a domestic state they love barley, eating about five pounds weight a day; as many dates, and twenty-five pounds weight of grass. They give him the fresh bones of their meat, breaking them into pieces and mix with the barley. But everything is good for them, grain, white corn, sorgho, beans, all fruits and vegetables, shrubs, bushes, leaves of trees, oil cake; they devour the olives; they swallow small stones every day, no doubt to triturate their food. They drink very little in winter, and as

dews are very abundant then, they go twenty days or even a month without drinking. They do not love rainy, stormy weather. They, however, love to bathe, much after the same way that ducks and geese do, but they cannot swim.

AGRICULTURAL COLLEGES.

France has some. Ten years ago her chief one was at Grignon, about twenty miles from Paris. About 1,200 acres, with a large dwelling house on it, formerly a royal seat; other necessary buildings added since. Charles X gave it to a society of gentlemen for an agricultural school, and for 40 years, who subscribed $60,000. They pay to government the old rent. Sixteen per cent on their capital has been realised by them, which goes into capital. Free pupils supported on the profits; two years term of study, &c.; lectures daily; examination of pupils as to each preceding lecture; Monitors, who labor in the fields with pupils. The pupils who have means, pay one hundred and sixty dollars per annum. A pupil does general work, and has also a price for his own work. Up at four o'clock A. M., in summer, to bed at nine o'clock.

Veterinary school of Alfort, six miles from Paris, on the Seine, near Charenton. Two others chools, Lyons and Tholouse. Whole number of horses in them one thousand three hundred and thirty-two, of which eight hundred and thirty-eight are stallions.

Board and lodgings at Alfort, eighty dollars a year a pupil, three hundred of them, of which government supports forty, and all the professors.

AMMONIA.

Is in salt products of volcanoes, ocean water, small quantities in putrid urine, in decomposition of animal matter, in minute portions in air, most in cities, where much pit coal is burnt. On the window glasses of London, sulphate of it causes dirt. Originally from burnt camels' dung. We get it now from distillation of pit coal, animal substance, such as bone, hoof, horn. It is a compound nitrogen 1, hydrogen 3.

THE BRITISH MUSEUM, JUNE, 1857.

Expenses for '57 and '58,		$335,000
Salaries,		150,000
House expense,		16,000
Purchases, &c.,		90,000
Binding, Cabinets, &c.,		55,000
Catalogues,		11,000
Total visitors in	'56,	366,714
do	'55,	334,089
do	'54,	459,262
do	'53,	661,113
do	'52,	507,973
do	'51, (the grand exhibition,)	2,527,216

Highly interesting articles are constantly being added.

Last year, 33,769 specimens in zoology.

do 6,700 do geology and mineralogy.

do very interesting articles in botany.

AGRICULTURE, BOTANY, VEGETABLE LIFE.

Theophrastus, of Athens, about 2,200 years ago, had lived one hundred years, and devoted a great part of his century to practical knowledge of plants.

He found a plant to be an organized being, of vital powers, "fixed to a peculiar spot, to draw nutrition, propagate and rot."

He called the bark skin, the sap blood, and the body flesh; he called pollen by its proper name, semen; and the marriage of the male and female plants exact as in locomotive animals, remarking as no botanist has yet remarked, that this semen of plants has the same odor as the animal semen.

He divided the vegetable kingdom into trees, bushes, plants and herbs. He taught accurately the sexual system in plants. He described the smut and rust in wheat and its causes and remedies and preventions, with an exactness not yet excelled, notwithstanding the vast aid of our modern microscopic power. He proved the true movement of the sap—understood and successfully practiced grafting and budding. He pointed out the various uses of the vegetable world, besides their part as food for

animals, viz: For wheels—Holm oak, particularly for the single wheel of the wheelbarrow! the use of the bark of the alder for tanning skins; sumach for dressing them; elm wood for doors, and cypress as the doors of the temple of Diana of the Ephesians, the only wood then supposed capable of a true polish; painter's boards of heart of pine; wine cups for drinking, of the knots of trees—some from the black terebinths of Syria, making a cup called Thericlean, almost like potter's ware.

The Persian apple, and citron, were recommended by him to sweeten the breath, and they were scattered among clothes to keep away moths; they made double flutes from jointed reeds—the best grew at Orchomenos; the coblers' strops for sharpening their knives, were made of the gritty wood of a wild pear tree; seals were engraved on worm satin wood; images from the wood of the palm tree, some of which were found in suitable weather, to sweat apropos! couches and lounges were made of ash or beech wood, as well as of willow, vines, &c.; ships were built of pine, which was very abundant at Sinope, on the south side of the Black sea—the dwelling place of old Diogenes.

He describes the abundance of radishes at Corinth and Bœotia; double roses at Philippi; the heavy crops of grain and other plants of Macedonia and Bœotia, and the light crops of Attica and Laconia, chiefly barley; he praises the asparagus, caper, artichoke, lettuce of various kinds, (no blood red lettuce) among them, nor among us now. He says, that walnut trees bore better crops if they were moderately flagged—so some moderns say. They sowed their mint and cummin with curses! to insure a good crop! He always looked for a fine crop of mushrooms just after a thunder storm—so do some of us moderns. (We suppose the warm rain does that.)

They made their lager beer, (βρυτον,) the Egyptian beer, from barley, &c.

And as to manures—the food of plants—it was as well understood as it is now, or ever can be, viz: The soil is composed of all that is left by disintegration of matter and atmospheric elements. If England had now all the vegetable and animal matter it has produced since the deluge, it is supposed that her surface would

be more than one hundred feet higher than it now is. James Madison, after being President of this Republic, was elevated to that of President of an Agricultural Society—when he delivered an opinion so original and scientific that it has neither precedent nor copy. He said that "God gave the globe to man to command, to till and adorn it; that, therefore, he adapted the man to the soil and the soil to the man." That on level lands covered with vegetation since the deluge, the average depth of soil is one foot only.

[Journal of the Society of Arts, July 10, 1857.]

From this very valuable work, we extract the following excellent article on Fibre, for which the society has invited information, and has received a deluge of new ones:

HIMALAYA HEMP.

A short time ago, a London rope maker, received several bales of Himalaya hemp, at about £30, ($150) a ton. On opening several bales it was found that the hemp was twisted into little lots, about the thickness of a finger, and as tight as the strand of a rope. The hackling of it cost five times as much per hundred weight as Russian hemp. It was repacked and sold at auction at a loss of 50 per cent. The mode of retting, (rotting) in Bombay, depreciates it to less than 40 per cent. Instead of steeping it in water, it is buried in sand or mud, by the side of a river; this increases its weight 14 to 20 per cent—not only to the partial ruin of the material, but to the ruin of our poor workmen, owing to the fine sand getting into their lungs, death has ensued. Several bales of pressed packed flax straw, have lately been imported from Australia, and sold at auction, at a high price, £5. 5.0 per ton, ($26.) Large quantities of flax straw, are sold here at ($20) per ton and less. But the expenses of importation from Australia, are swallowed up in freight charges, &c.

THE RHEEA-FIBRE, OF INDIA.

Is a species of China grass. It is worth more than all the other fibres of India put together. It is adapted to general purposes in a most extraordinary degree, from the finest thread to the coarsest canvass and cordage. Its strength is unequalled, and resists damp

more than any other fibre. The product per acre is most extraordinary. Three cuttings a year, yielding from one to one and a half tons an acre of clean fibre—while flax yields but from 300 to 500 lbs. an acre.

VITALITY OF THE DIOSCOREA BATATAS, OR CHINESE YAM.

By M. P. Duchartre.

The attention of gardeners is now so fixed upon the cultivation of this Igname, (yam) that all the facts in reference to it should be stated. I ask permission of the Imperial Society to lay before it some of them. I have heretofore stated the remarkable energetic vitality of this tuber, and submit the following:

On the first of July, 1855, M. Francois Delessert, received from Shanghai a considerable quantity of the tubers, being of the Chinese crop of 1855. They came around the Cape of Good Hope; a long passage. But they, that is, the sections of them, (for the Chinese always cut each yam into three pieces,) all arrived in very good condition, (trés bon état). They were simply closed up in a cask filled in with sandy earth. There were mixed with them a production which we are unacquainted with, at least, as far as my knowledge extends. These were a sort of thick stalks about one centimetre (three-eights of an inch) thick, and varying in length from ten to twenty centimetres (from four to eight inches) long, quite irregular lengths, some a little branched, with the tubercles still attached to them, resembling, what are called, rhizomes, (horizontal roots.) I planted pieces of the yams, from an inch to four inches long, on the 7th of July, in a very light soil near the southerly side of a wall. I left them out all winter without the least shelter. In May last, I examined the tubers and found them exactly as sound as when they were planted, ten months before, (July.) I believe it would be difficult, if not impossible, to find another feculent tuber (starch) to keep so well in the ground. I find that this Chinese yam will keep sound in the earth under very unfavorable circumstances, for two years, at least. This is a distinguished merit highly profitable to the farmer, and deserves a particular notice of the Imperial Society.

[Bulletin Mensuel de la Societe Imperiale Zoologique d'Acclimatation, Paris, July, 1857.]

THE ARABIAN HORSE.

By M. Richard (du Cantal.)

The society gave to Mons. Albert Geoffroy Saint Hilaire and myself the honorable charge of studying on the spot the resources of animal production by our beautiful African colony. We now come to render our account of the observations which we have made on this grave and important question, as to our national riches.

To facilitate our labor, we have divided it. Mons. Saint Hilaire specially occupied himself with the sheep, goats and fowls. I took the horses, asses, oxen and hogs.

The Algerian horses, known by the name of Barbs, form a precious race in every way. They always show (unlike our French varieties) distinct types in their whole nature, development, anatomical conditions, physiological, tissues, aptitudes, &c., &c.; they have an analogy of conformation, of nature and temperaments. In one word, a *family air*, a common physiognomy, which makes them distinct everywhere they are studied.

The most remarkable difference observed in these barbs is, the the greater or less degree in the stamp of their nobility; this is according to their high plateaux, or the low and more or less humid pastures. The degree of nobility, perhaps, depends also upon their primitive origin. (I shall have occasion to return to this point.) Their stature, which depends above all on the abundance of their pasture and the care taken in bringing them up, cause some differences among them. But whatever marks of individual development or distinction there may be, still, they all have the general anatomical and zoological character appropriate to the horses of oriental blood. They have a great deal of that peculiar fineness of the tissues of the skin, the horny skin. Their bones have a peculiarly close texture, very compact, and of remarkably great specific gravity; a fact peculiar to all the types of this noble race. The fibres of their organs, generally, are smooth, and united by a cellular tissue, very fine, but not abundant; an anatomical condition which gives to their whole organism an especial muscular force, compactness. This fact explains the reason why these African horses, even when apparently poor

and wretched, a vigor and power of resistance which always astonish a man who mounts one of them not knowing these facts.

This animal is essentially of a nervous temperament, and consequently irritable. Yet they present a physiognomy expressing mildness, confidence, and a great docility, which is felt in their precious qualities for the saddle, for the manége and promenade. And, moreover, their sobriety, rusticity, (country like,) endurance of fatigue and all sorts of privations, render them of the first order, fit for war, even when they lead you to suppose by their appearance that they are too much enfeebled by their sufferings. They have proved all we say, during the twenty-seven years' campaigns, and in Africa. And recently they have given most striking proofs of it in the war of the East. The English army saw, in the beginning of the Crimean war, its fine, large-framed, full-sized horses perish, while the French, on their African horses, were always ready for charge or combat, in spite of all the misery, privations, and fatigues, excessively great, to which they were exposed, and to which the English horses became victims.

In fact, these very barbs, the Numidian cavalry, gave great trouble to the Romans, and they have maintained their character age after age, down to our days.

MAKING SUGAR,

Has become a very interesting question among us, on account of the recent introduction of the new sugar canes of the east and of southern Africa. A brief view of this question will be acceptable to us.

Theophrastus, over two thousand years ago, spoke of the honey contained in reeds. No mention of sugar is found in ancient Egypt, Phœnicia, or in Judea.

The Grecian physicians speak of sugar, a concrete like salt, of a honey taste; they called it Indian salt. Dioscorides and Pliny describe a sort of sugar candy, as in use then. The Indian salt was brought to Rome and Greece, from India within the Ganges, and from Arabia. The sugar cane then only grew on the islands of the Archipelago, in Bengal, Siam, &c. This sugar found its way first into Arabia, about six hundred years ago, when merchants first began to visit India. The Persians, Egyptians, Phœ-

nicians, the Jews, Romans, Christians and Mohammedans make no mention of sugar before that period.

The Arabians sought for plants to extract sugar from. They found one, which they called *Alhassor Zuccar*, (sugar,) but it was only sugar candy, *Zuccar mambu*, or by the Persians, *Tabaxir*.

Various theories prevailed as to the origin of this delicious sweet. That it was honey formed without bees. A sweet shower from heaven falling on the leaves of reeds. That it was a sweet gum formed in the reeds. All this was stopped by Marco Polo, in 1250. He said Bengal abounded in sugar. The merchants began to bring home the sugar, and the silk worms. But before this time, Lafitan says, that William Second gave to his kingdom, Sicily, a sugar mill, to grind their canes, first given to the monks of Saint Bennett. In 1520, the island of St. Thomas had more than sixty sugar manufactories, which made nearly five million pounds weight of sugar. It was planted in Provence, in France, but cold destroyed it. It partially succeeded in Spain.

Soon after Columbus discovered Hispaniola (Little Spain), Pierre St. Etienne took the sugar cane from Spain there. Michel Ballestro was the first man who extracted the juice from it there; and Gonzales de Velosa was the first to make sugar of it. That island was afterwards called St. Domingo, and laterly, Hayti.

Sloane says, that the cane there grew as large as a man's wrist, and one root produced twenty to thirty canes. Sugar cane is not indigenous to the Americas, North or South. Captain Cook said he found sugar among the natives of the islands of the Pacific.

In 1466, sugar was confined to medicine and great feasts, and so down to 1580, when it came from Brazil to Portugal, and thence to England.

The sugar cane contains three kinds of juice, one aqueous, one sugary, and one mucous. The cane rarely flowers, and then the top joint, called the arrow, four or five feet long, bears a feathery panicle, very delicate, and sterile.

Cane from Otaheite (Tahiti) makes the finest sugar. Its cane joints are eight or nine inches long, and two in diameter. It is ready for sugar in ten months' growth. Some sugar lands in St. Thomas have yielded per acre five thousand seven hundred pounds

of sugar. The Batavian cane, of a deep purple color outside, is fit to grind in sixteen to eighteen months.

Culture of this Sugar Cane.

In India, pieces of cane having three joints are planted horizontally, no seeds.

In West Indies, canes are divided into plants and suckers, which spring from the stalks of the plants. These suckers are commonly called Rattoons. The top of the cane, with its two or three joints, the leaves stripped off, are laid horizontally in the ground, and covered one or two inches with earth. The young plants appear in about fourteen days after being planted. The rattoons are planted also. In India, from 1,500 to 1,900 pounds of sugar per acre, is a good crop.

Relative Quantity of Sugar and Cane Juice in Jamaica—Eight years' observation on a plantation.

2,200 gallons of juice, average a ton of sugar, 2,000 lbs. Hogsheads of sugar, average 400 lbs. So that a gallon of cane juice yields about one pound of sugar.

As our new sugar canes from China and southern Africa yield here (say) four hundred gallons of syrup per acre, being about one in five of the juice, which therefore must be about two thousand pounds. We believe the result in sugar will be as great as on the Jamaica plantation. When these stalks have grown three or four inches high, he gently hills them up by hand, so as to avoid doing them the slightest injury. As they grow he hills them up again, finally surrounding each stalk with a good stout hill, which is rounded. All this is done by hand. All weeds are taken away. He never uses any implement about them. He obtains, in this way, surprising results, in both size and quality.

It is true, that the degree of sugar will vary with soil, culture, climate, weather, &c. But the seed gives us the canes by a labor ten times less than by the cuttings of cane, as any one will see who examines the best sugar plantings of the West Indies or Louisiana. And this, too, in all the temperate regions of the earth where men that are not black may work with health and long life. The sugar produced by these new canes may well be called the White Man's Sugar. And in any soil or season which may fail in the sugar, the seeds and stalks will pay richly to the farmer for feed.

Out of all the refuse in making sugar, being about seven per cent. of the cane juice, rum is distilled; and about eighty gallons are made out of the original juice, while about sixteen cwt. of sugar, or hogshead, is made. The average quantity of rum to sugar is even as high as ninety-two gallons to the sixteen cwt. or hogshead.

[Revue Horticole, Journal d'Horticulture Pratique, July, 1857, Paris.]

BLUE DAHLIAS AND BLACK ROSES.

The question has been put to us, Why does horticulture resolve the problem of blue dahlias and black roses?

Here is our answer. The blue dahlia will probably never be produced. Humboldt found the dahlia wild in the high valleys of Mexico; he thought it a faithful form of Helianthus, sunflower. It was boasted as a new table root at first, but it was soon found to be totally unfit to eat, having a sharp, peppery, acid taste, aromatized. Next the gardeners dropped the flowers. But the seed happening to be planted, produced a new variety of the flower, remarkable both in colors, forms and size; became imbricated regularly; still it produced seeds; soon it gave double flowers, and so on to probable perfection in forms. The colors extend from pure white to red, and almost to black; all tints but blue alone. Nature seems to have refused blue to dahlia. Its natural colors are red and purple. Attempts at crossings with the white, lilac and deep violet, do not succeed. Are there black or blue roses? It is useless to talk of it by graftings on various stalks. Those never affect the colors. Hybrids, if anything, may do it. The Italian horticulturalist, Velaresi, first modified roses; he was an amateur.

By mixing the deepest colored Chinese nacarat roses, they obtain very deep purple roses; we can hardly hope to come nearer to black than that.

A great noise was made lately about the growth of a black rose. M. Alphonso Karr asked the learned gardener of the Luxembourg about it, who remarked, that the black rose existed in the journals only. I regret, said Mr. Karr, that I do not know the inventor of the blue rose, for I would have recorded it after the names of Jules Janin, who did invent the blue pink, of Madame

George Sand, who invented the blue chrysonthemum, and of Alexander Dumas, who has spoken of a black tulip, and of Madame de Genlis, who actually brought to France the first moss rose, and talked about green and black roses; of Balzac, who described azaleas as climbing around a house; of Rolle, who gave an intoxicating odor to camellias; and of Victor Hugo, who was really the promoter of the thornless, scentless rose of Bengal.

THE MEDINILLA.

It is a remarkable and important plant. It is of the family of Melastomaceæ, from the forests of Manilla. It puts forth roots into the bark of trees, and is in part an air plant or pseudo parasite; quite a large growth. A splendid flower in bunches. Calyx violet; petals deep rose outside, and pale rose inside; very bright colors; gold colored stamina.

Solon Robinson—It is one of the greatest errors of nurserymen to grow their trees with long tap roots and slim, whipstalk-like stems, which they do by trimming off the side limbs of the young trees to make them grow tall, as that seems to be about all the quality they aim at. But for this, they are in some manner excusable, because their customers demand such trees. Yet these slim sprouts fail to grow into a satisfactory shape. Perhaps the fashion of growing trees without limbs near the ground arose from the necessity, in early times, of growing a crop upon the same ground with the trees. It is time that fashion was changed.

T. W. Field—The true object of growing an orchard is to grow trees for their fruit, and not to obtain some other crop from the same ground. This object can only be attained by growing all our fruit trees so as to branch them near the ground. Both root and top pruning is absolutely necessary. The tap-root shonld be cut so as to make the tree send out the roots near the surface, and these should be protected from drying by mulching. If the tops are low and spreading, so will the roots; both will incline to a corresponding position. A tree that spreads its roots will produce fruit much earlier than one with tap-roots and tall branches. I would trim all my nursery trees from the top, instead of cutting away all the lower limbs. I would take up

all seedling trees, and cut away the tap-root, and in two years I would transplant again, and again trim off tap-roots. The third planting would fit the tree for fruit bearing. If the leaves are fully ripened, the tree may be taken up with the leaves on, while green.

Mr. Wellington—Mr. Joseph Pease has a new bean which I wish to call attention to. They are the most remarkable snap beans I have ever seen; so rich and tender.

Mr. Pease stated that the seed came from Germany. The pods, when advanced to a yellow color, are stringless, and the most tender and mucilaginous I have ever eaten. Some of the pods of these beans were exhibited, and although far advanced toward maturity, in fact, turning yellow and showing the beans half grown, the pods broke as short and easy as common snap beans in the first days of their growth. Mr. Pease will save some seed for distribution another season.

POTATO CULTIVATION IN FRANCE.

One cultivator prepares the ground just as he would for peas, and gouges out eyes and sets them in little drills, and presses the earth upon these potato seeds with his hands, and afterward takes care to keep the plants free of weeds, and gives very little other cultivation than what is done with his hands, and gets excellent crops.

Dr. Ramsey exhibited a draft of a new steam spading machine. He said the way he has overcome the want of traction, that has heretofore been the greatest difficulty in machines for plowing, is by putting the spades at the stern, throwing back the dirt, instead of digging forward. This has a tendency to propel the machine, instead of retarding it or causing the traction wheels to slip on the ground. This machine is calculated to spade a track six feet wide, one foot deep, with an engine of sixteen horse power.

An animated discussion here ensued upon the possibility of ever advantageously using steam for plowing or digging in general farm purposes.

Solon Robinson expressed a most decided opinion that it never would be done, and wished to leave that opinion as a prophecy. He thought some of the impetuosity of inventors needed an honest expression of opinion, as well against their projects as all in their favor. He had no faith in steam plowing and spading.

One of the regular subjects of the day was now called up for discussion. This was the general subject of

SMALL FRUITS.

Prof. Mapes—If we would get at the true market value of small fruits grown in this country, no doubt it would equal the value of the cotton crop. It would astonish all who live in this city to learn the quantity of berries brought into the city. It is estimated that Drew & French, only one commission house, will sell this season a hundred thousand dollars' worth of berries and small fruits. The enormous quantity of peaches received in the city may be guessed at, when we learn that the Camden and Amboy railroad have received $1,400 freight in one day, at eight cents a basket, for peaches.

Mr. Lawton was called upon to state his manner of cultivating the Lawton blackberries. He said he would plant the roots in rows ten feet apart, and four feet between plants, and cultivate two or three rows of potatoes between the rows. They will bear some berries the next year after setting, and come to maturity in three years. I always cut away one-third of the new growth. The berries set upon the vines ripen from two to five per cent a day, and each plant will grow an average of three hundred berries. The plants need no training or support, and will grow, the first year, about four feet long. It has been suggested that this variety of blackberries would deteriorate, but they have not done so with me. The advantage of this variety is its long continuance in bearing.

Prof. Mapes—I have settled down upon this plan: First, to throw out a furrow with a two-way plow, and run a subsoil plow in the bottom of that furrow, and I manure highly. I do not plant so far apart as Mr. Lawton, and I trim closely, and use the

cultivator between the rows. If the old plants are well cut away the new shoots will be stronger. I think the quality is very much improved by training the vines upon trellises. The fruit is larger and better upon strong shoots, and nothing feels the advantage of high manuring more than all the bramble family, particularly the application of liquid manure. You may manure all the bramble family with animal offal. They can convert flesh into fruit. This is also the case with grape vines. They are rank feeders. I have found arching and tying the vines together a good plan.

In reply to a question, Prof. Mapes said he had had no rotten potatoes upon any land where he had drained or subsoiled, but upon some rented ground, that had always been shallow plowed, the rot had affected the crop; and upon all land in the neighborhood that had not been subsoiled the rot prevails. A new variety of potatoes, called the Golden Mercer, and another called the Boyden potato, do not rot. Both are excellent in quality. The Nutmeg potato, that was thought to be proof against rot, has not proved entirely free this season.

The next subject will be a discussion upon "the proper manner of treating Indian Corn; particularly as to the disposition of the growing crop—whether it is best to top it, cut it up and shock it, or let it stand and ripen, and risk the frost."

Farmers from the country are invited to attend, or send communications of their opinions upon this all-important matter.

The meeting will be Tuesday, September 15, at noon, at No. 351 Broadway.

The Club then adjourned.

HENRY MEIGS, *Secretary.*

November 17, 1857.

Present—Messrs. Hon. John D. Ward, of Jersey city, Professor James J. Mapes, Dr. Isaiah Deck, Dr. Waterbury, Dr. Wellington, the venerable Dr. Darling, Dr. Smith, Mr. Issachar Cozzens, Solon Robinson, Mr. Davoll, George B. Rapelye, Mr. Van Boskerck, and others.

Hon. John D. Ward, in the chair. Henry Meigs, Secretary.

The Secretary read the following extracts and translations received from Europe and elsewhere, by the last steamers, viz:

FAIR AT SAN FRANCISCO, 1857.

Cabbage, 72 lbs.; 4 squashes on one vine, 800 lbs.; beet, 85 lbs.; apple, 15 inches round; peaches, 10 inches round; splendid white grapes; pear, 16 inches round, weight 26 ounces; Duchesse d'Angouleme pear, 28 ounces.

ARTESIAN WELLS IN THE DESERT OF AFRICA.

What a step of modern science for the Sahara!

The Moniteur, of Algeria, states that the first well was bored in 1856, in the Oasis of Oued Rir, near Tamerma, by a detachment of the Foreign Legion, conducted by the engineer, Mr. Jus. Began in May; they obtained water in June; about 4,000 quarts per minute; about 600 hogsheads per hour; temperature, 21 Reaumur=about 75° Fahrenheit. The joy of the natives was unbounded—a miracle! The Marabouts with great solemnity, before a great crowd, consecrated the new well by the name of *The Well of Peace.*

Another bore in Temakin, gave 120 quarts per minute; same temperature; depth about 270 feet!

A third, not far distant, in the Oasis of Tamalhet, gave 120 qts. a minute.

These supplies of water on the deserts, will effect a wonderful revolution—for they can be made to irrigate and produce vegetation rich, where none ever was before!

[Bulletin Mensuel de la Societe Imperiale Zoologique d'Acclimatation, Paris, Sept., 1857.]

THE OLIVE OF THE CRIMEA.

By M. O. Tuyssuzian.

In consequence of a note which I had the honor to write to the society on the Crimean olive, our very zealous secretary, M Dupin, hastened to write a flattering letter on the warm interest I have in this great question, of such vital importance to our southern agriculture. It is with the happiest feelings that I give the ensuing details.

Whoever has visited the south of France and Europe, where this tree of Minerva yields its mild blessings, has felt his heart rent at the sight of the magnificent olive trees ravaged by a rigorous winter.

Ever since that disastrous winter of 1829, the most melancholy one in the annals of the olive regions, the very recollection of which is frightful, investigation has taken place. The celebrated and sagacious Oscar Leclerc (too soon snatched from science) proved that the brown olive, of the Department of the Var, resisted cold much better than any other kind. That the Palma or Agua, of the eastern Pyrenees, hardly lost the tips of their branches, while other sorts lost branches, and in many the whole trunks died. About that time, Mr. Artwichs, the director of the Imperial garden of Nikita, near Symphérople, in the Crimea, published an account of the olive there, which was unhurt by that severe winter of 1829, when the cold was thirteen degrees Réaumer, (four degrees above zero Fahrenheit.) This information made a noise, and the Palma olive tree proclaimed as the hardiest of all the olives. But there are three sorts proved to be as hardy.

A very interesting note, published from an honorable member of the Vancluse Agricultural Society, states, that during the hard winter of 1854 and 1855, the Crimean and the Palmo olive trees proved as hardy as was said of them. For while the Blan Vetier, the Villedieu, the Grosse Seville, the Grand Seigneur, and even our Brown Olive, lost their top branches, the Crimean and Palmo only, had their leaves turned reddish color, their bodies and branches being smooth and sound. Mr. Francois Poulin, a meritorious cultivator at Thabor, near the Bedarrides, near Avignon, has long experimented on the Crimean Olive, and proved the excellence of its fruit as well as the hardiness of the tree—the facts are incontestable.

We add the testimony of a crowning character—that of the excellent brothers Messrs. Audibert, of Tarascon, who said in a letter of July 9th, last: "That the Crimean Olive, established in their magnificent gardens at Tonelle, in 1837, have survived not only severe winters without damage, but severe inundations also. These noble Olive trees are from plants sent to us by Mons. Chal

laye, Consul of France, at Odessa, in 1837. The plants suffered somewhat in the transportation on a long voyage, but they entirely recovered after two years care with us. Their position exposed them to several inundations from the river Rhone, and they have withstood drought and cold, especially the intense cold of January, 1855, when our Crimean Olive only lost a few leaves. We present the following tables of the relative qualities of the Olive trees as to hardihood:

First Category.

Trees which were affected by cold, only in the leaves at the tops of branches:

1. Crimea.
2. Palma.

Second Category.

Those that suffered loss of small branches:

1. Sup'fine variety Blanquetier.
2. Souraou.

Third Category.

Those that suffered loss of half their wood:

1. Round fruit, (Redonnou.)
2. Pieboline.
3. Bicaro, (Agladaou.)
4. Verdul.
5. Picholine, (Long leafed.)
6. Salon.
7. Negret.
8. Villedieu.
9. Noir de Grasse.
10. De Grasse.
11. Amelon.
12. Corneau, (Large fruit.)

Fourth Category.

Very badly damaged indeed:

1. Berruguet.
2. Pleureur.
3. Pointu.
4. Sourine, of Istres, a variety of Picholine.
5. Gros Redonnou, (Groussan.)
6. Barreling.
7. Traoucasa.
8. Caillon de Varages.
9. Margrier.
10. Grosse Paumale.
11. Grosse Seville.

The above being admitted, the grand problem of oil for the United States is solved. A large portion of our South can grow the Crimean and the Palma olives, and thus complete for the United States, the vast trio of the agricultural blessings bestowed by our Creator, "Corn, Wine and Oil." We eat butter! but it would be better for us to eat that vegetable butter the Olive oil.

H. Meigs, *Sec'y.*

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

September Meeting, 1857.

[A paper on the proportion of phosphorus in Legumin, by Dr. Voelcker.]

"The use of the prism in detecting impurities," by Dr. Gladstone. The instructive results obtained with liquids when the ray of light traverses them in a wedge-shaped vessel. He showed the value of this means in detecting impurities in colored confectionery, tea, mustard, wines, liquors, pigments, gems, and pharmaceutical preparations, &c.

VITALITY OF SEEDS.

Dr. Daubeny, of Oxford, read the report of the committee on the vitality of seeds. He exhibited a register kept in the Botanic garden, showing the experiments on seeds. The shortest period of vitality was eight years, the longest forty-three years.

Grasses 8, lilies 10, conifers 12, lindens 27, malvaceæ 27, leguminosæ, or fabaceæ 43, rhamnaceæ 21, boragniaceæ (borage,) 8, convolvulus 14, compositæ 8, umbilifers 8, crucifers 8.

INDIAN CORN.

Mr. George Emerson, of the United States, stated his doubt of its being strictly a plant of the new world, from the fact of its being found in a floral decoration in Rome, in the time of Raffaelle. (I suppose he means Raphael Sanzio, who was in his prime in about the year 1507, after the voyage of Columbus. H. Meigs.) Bravo, Emerson! try again!

The Chairman thought that question had been settled by Alfonso De Candolle, in his recent work on the geographical distribution of plants, quite complete.

Mr. Moore, of the Dublin Botanic garden, related an instance of his success in producing a new species of leguminous plant, from seeds obtained by Mr. John Ball, from a vase discovered in an Egyptian tomb, and that he had picked out of the wood of a decayed elm, at least fifty years old, seeds of Laburnum, many of which, when planted, produced young trees. He had raised barberies from seeds in raspberry jam, notwithstanding the heat em-

ployed in making the jam; that many seeds grew better for being put into boiling water before planting.

Mr. Daubeny stated that seeds did not retain their vitality if entirely excluded from air; that brown paper or any porous paper preserved them.

Mr. Archer stated that seeds from China, put up in air-tight vessels always failed to germinate.

Dr. Isaiah Deck, analytical chemist, according to his offer, proceeded with his chemical agents before him, and the guano, phosphates, &c., to give to the club the following remarks:

On the Island of Jamaica, there are great deposits of bat's dung in the great caves, where it is found to exist to the depth of two or three feet. One cargo has been brought here and readily sold at $15 per tun, which is its commercial value for the ammonia and phosphates it contains. It is a curious looking article, appearing more like peat than anything else. It gives off a very strong smell of ammonia by the addition of potash. It is used as a fertilizer to a considerable extent upon the Island of Jamaica. The food of bats is largely of the young shoots of sugar cane, together with some animal food, and this excrement, it is thought, will prove a cheap fertilizer for farmers here.

GUANO FROM THE ISLAND OF SOMBRERO, 140 MILES FROM ST. THOMAS.

The crust of the Island is composed of a rock containing 92 per cent of phosphate of lime. He showed some very interesting specimens, and stated its value at $32 a ton, though a cargo lately arrived sold at $30. The Island is two miles wide and three miles long, and the phosphate is about 40 feet thick. Dr. Deck's theory is that the crust was originally formed of bird droppings, and then submerged, and heated by volcanic action, and then thrown up again. Dr. Deck showed a sample of a cargo of guano, now on its way from the Pacific, which is called

CALIFORNIA GUANO.

It is from the Island of Elide, on the coast of Lower California, latitude 28° 40′. Its analysis is:

Moisture,	4	per cent.
Volatile organic matter,	57	do

Soluble phosphates,	33 per cent.
Phosphate soda, &c.,	5 do
Sand,	4 do

This Island is about six miles broad, with a deposit thirty feet deep. A cargo of 1,000 tons is now on the way here. The quantity calculated on the Island is over 2,000,000 tons.

BAKER'S ISLAND GUANO.

Dr. Deck gave his opinion very favorable to the guano from Baker's Island. He said guanos are of two kinds. One contains an excess of ammonia, and the other an excess of phosphates. One is more suitable to one soil or crop than the other. The phosphate guano is a more durable fertilizer than the other. Sometimes its effects last for years, and therefore more adapted to the permanent improvement of land. Some statements of experiments made with Baker's Island guano, which contains a large per cent of phosphates, show it a more valuable fertilizer than Peruvian guano.

Professor James J. Mapes inquired, and found that this guano was identical with what had been imported into Boston as Mexican guano. It was not hard to grind it.

Before the subject of the day was taken up, Prof. Mapes was anxious to speak of phosphate of lime. He only repeated what he had so often reiterated as to the specific difference in the material, and the results of the native mineral and that which has passed through living organisms. The phosphate rock will not assimilate with plants, nor act as a pabulum. He did not believe that the dung of birds was the foundation of the guano so abundantly brought here. It was notorious that the mineral matter derivable from a burnt haystack was far more valuable than the same quantity of the same mineral matter taken from the rock. Analytically alike, the practical value was quite another thing. It was an important fact and could not be too extensively known.

Dr. Deck said that these injurious results of the native mineral are, perhaps, traceable in the apatite of Estemadura, and in other cases, owing to the presence of fluoride of calcium, which is poisonous to plants.

Prof. Mapes said that even at Dover, near Lake Champlain, where there is an entire absence of the fluorides, his remarks and the same results apply. The calcined bones of these animals answer best.

Dr. Waterbury contended that the whole was a question of solubility. Organic matters were undoubtedly more soluble than mineral guano. Ammonia was worth more in the market than any other ingredient in manure, and that being so, that guano was assuredly of the highest mercantile or marketable value that contained most ammonia. Yet if the richest guano were laid on land that did not need it, it would be so much material thrown away. A young physician prescribed successfully for his first patient, a shoemaker. His next patient was a tailor. He tried the same remedy, but the patient died, and the physician erroneously made this entry in his note book: "*Mem.* What will cure a shoemaker will kill a tailor."

Prof. Mapes said it was right to determine the quality of soils before applying perhaps an excess of what they contained. But then, that excess might exist in a shape such as the plant could not take up. In that way it was that lime and soluble phosphates would be found useful on limestone and phosphatic soils.

JAPAN SQUASH.

Hon. R. S. Livingston, presented one, about 16 inches long and 7½ inches thick, raised by him this season on his farm, on Hudson river, from seed given to him by the Farmers' Club, in May, 1856. The seed was given to the Club by Commodore Perry, of the late Japan expedition.

The learned judge treated the seeds with his usual skill, planting in one of his hot beds and transplanting to open air in June. The melon in question, is in shape like an oblong water melon, skin smooth, color pale green, very much like that of the ripe gourd. Its specific gravity is the greatest known in the order of the Cucurbitaceæ (melons.) It is that of water, (1,000 ounces per cubic foot.) The Judge thinks that it will serve as a sort of substitute for the Melongena, (Egg plant,) and probably be useful, in some measure as a food for stock.

Mr. Meigs stated, that Commodore Perry gave us, among other things, from Japan, a bean pod, very like our locust honey bean, in everything but magnitude. For this one, perfectly dry, measure twenty-three inches long and three and an half inches wide, containing eight beans. When ripe, this pod and its beans must have weighed twenty-four ounces avoirdupois. He has planted one of these beans, and Judge Livingston another.

Mr. Meigs—In reference to the great question of fertilizers, no one has more fully explained the indispensable necessity of a perfect analysis of the soil, before any manure is applied, even barnyard manure, than Prof. Mapes. There may be too much or too little of a constituent of soil. One of our most distinguished members, from what was said in praise of a top dressing of lime, ruined a farm for several years by doing it, and found, too late, that his land contained an overdose of lime before. All knowing gardeners manufacture the soil for plants according to their well known wants, mixing even by means of sieves, as carefully as they would flour a batch of bread, &c.

The following subjects were ordered for next meeting: Proposed by Prof. Mapes, "Winter treatment of barn-yard manures." Proposed by Solon Robinson, "Proper winter feed and treatment of milch cows."

The Club then adjourned to first Tuesday of December, 1857, viz, December first, at noon. H. MEIGS, *Secretary*.

December 1st, 1857.

Present—Messrs. Lawton, of New Rochelle, Payne and Thomas W. Field, of Brooklyn, H. H. Wheeler, of Highland Terrace, near South Butler, Wayne county, Benjamin Pike, Sen., of New Jersey, Alanson Nash, Dr. Smith, Messrs. Porter, of Metuchin, N. J., Davol, of Brooklyn, Pardee, John A. Bunting, Dr. Wellington, Mr. Solon Robinson, Dr. Waterbury, and others; twenty-six members in all.

Secretary Meigs read the following articles, translated and extracted from our last steamer's importation, &c.:

Among the highly valuable papers sent free of all charge to the American Institute, by England, France, Russia, Austria,

&c., we have to-day the late weekly numbers of the London Society of Arts, and of the three hundred or four hundred institutions in union with it.

BLACK BONED FOWLS.

There is in Honduras, a fowl of the Gallinaceous kind, a native of Peten and Yucatan, every bone of which is quite black. The legs, the pinions, the breast, the back bone, are all as black as ink. They are distinguished by their black combs and gills. Their feathers are generally black, and also their feet; they are neither larger nor smaller than other fowls; their flesh is perfectly white, and remarkably juicy and well flavored. When I first saw one of these animals in the shape of a very savory stew, I was not a little alarmed at the sight of the black bones, and I rashly accused the cook of having served up a diseased hen. Miss Mary Gordon, the artiste, one of those everlasting brown women, with nerves of wire and skin of India-rubber, repelled the charge with indignation, and explained to me the real state of the case. "Dat hen no sick, Sar. Dat hen berry good, Sar. Him de black bone fole. Him more betterer dan de oders. Sick hen, hi! dat hen make you fat, Sar. Sick hen, hi! You nebber eat anything like him in England, Sar."

Mr. Vaughan, of Chandos Lodge, Wimbleton, writes us, May 12th, 1857: "I beg to say, that I have both seen and eaten black boned fowls. They are known from their having black combs and gills. The plumage of those I have seen was black. They come from Yucatan and Peten. They are about the same size as the ordinary fowl. The meat is quite white, and, if anything, more delicate than that of other fowls."

"I have very closely examined and have bred these fowls, and have arrived at the clear conviction, that the blackness of their bones does not arise from any accidental circumstance, but that it is a permanent feature belonging to a distinct species. I shall not fail to introduce the breed into this country."

COTTON.

By J. B. Smith, M. P.

The importance of our cotton manufactures is best shown by the fact, that besides providing clothing for our whole population

our exports last year (1856) amounted to £38,284,700, being one-third of the value of our entire exports to all foreign countries; any serious interruption, therefore, to a manufacture in which millions of consumers are interested, would be little less than a world's calamity.

In forty years, the consumption of cotton in Great Britain has increased from 88,000,000 of pounds, to 891,000,000 pounds weight.

The imports of cotton into Great Britain last year, amounted to 900,000,000 pounds, of which 700,000,000 pounds weight were received from the United States.

The honorable gentleman then speaks of the slave power which produces it, &c., with which this Institute does not meddle, as it belongs to politicians, and not to our objects, which are those of the whole of America, its agriculture, its commerce, its manufactures and its arts. He examines the world for a cotton growing soil and climate in vain to match, or even approach the production of the United States. He finds that in India, the climate is unfriendly to the culture of cotton. An acre of land in India produces from fifty to seventy pounds weight of clean cotton; while an acre of America produces four hundred pounds weight. The American lands are rich and fertile, and are watered with rains throughout the year. The land of India, on the contrary, (except on the borders of the rivers,) is parched by a burning sun, and is, during eight or nine months in the year, almost without rain.

He considers irrigation the only remedy for India. Mr. Geo. Vary, who had twelve years experience there, and was late superintendent of the government cotton experiments in Sattara and Sholopoor, says: "The cotton plant, as at present cultivated, is an annual. The seed is sown towards the end of the monsoon. The bush seldom exceeds three feet and a half high; and forty pounds of clean cotton is considered a fair crop. After the cotton is collected, they pull up the bushes and burn them, as they all die during the hot weather for want of moisture. By irrigating these bushes, they can have the same bushes for several years. I have seen a bush nine years old, which produced three crops

of cotton every year, instead of only one crop. And the quality of the irrigated cotton is one hundred and fifty per cent. better than field cultivated cotton, which is easily accounted for.

But the works for irrigation all over India are in a state of ruin or decay. Besides, roads and communications are fundamental elements of national prosperity and wealth. And it may be said of India, that she has no roads, there being only three thousand to four thousand miles of metalled roads for a population of one hundred and fifty millions. While in England, there are one hundred and twenty thousand miles of metalled roads. For want of roads in India, cotton is brought four hundred miles to a shipping port, on the backs of bullocks, each bullock carrying about two hundred and fifty pounds weight; and their journey occupies two or three months. They are frequently overtaken by the rainy season; the streams and torrents become impassable, and droves of these bullocks die on the road from over fatigue. When railroads shall be established, the transit of now sixty-four days will be made in thirty-six hours. Mr. Mackay says it took him seven hours to travel in the bullock cart twelve miles, on the road between Jamboosar and the port of Tankaria. In 1839, railroads in India were projected, but only about two hundred miles are yet opened; while, in the same period, twenty thousand miles of railroad have been completed here. And a want of a tenure of the land, also, form a formidable obstacle to improvement. The king owns all. Except in Bengal, no person in India, native or European, can own, in fee simple, a single acre of land. With this system, no country can ever rise beyond barbarism.

Lord Stanley remarked, that a rise of one penny a pound of cotton, was a loss to the community of four to five million pounds sterling, ($25,000,000,) but little less than the whole of our income tax.

Mr. Crawford believed there was no risk of the falling off of the supplies of cotton from America, for centuries to come. He heartily wished it could be obtained otherwise than by slave labor.

It is recommended to send competent men with the proper machinery to India, to manage this fibre.

BLACK-BONED FOWLS AGAIN.

The Dutch ornithologist, Temminck, regarded it as a distinct species, and called it "Gallus morio," but is merely a variety of our Gallus domestics, or the Phasianus, Gallus of Linnæus. All, however, agree as to the excellent quality of it for the table.

Professor Blumenbach, in his comparative anatomy, states, that in some varieties of the fowl, the bones approach a black color. The same has been noticed by Abulfazel, the Vizier of Akbar the Great, as to fowls at Indore and Neermul, in Berar. See Ayeen Akberry, vol. 2, page 72.

Niebuhr has affirmed the same thing of the fowls of Persepolis.

The bones of the Gar-pike are said to be greenish in color.

Mr. Meigs—Several years ago, I deemed it right, among our wide researches for agricultural knowledge, to avail ourselves of all countries and ages. I gave many good lessons from Columella and Varro. Some thought they knew nothing compared with ourselves. Within a few years the civilized world rejoices in the grand invention of reapers, such as McCormick's, &c. Some time ago, I stated to the Club, that before the Christian era, similar reapers were in general use in Gaul, (modern France.) A sort of wagon body was pushed through the standing grain, at a height so regulated as to take off all the heads, while the straw was trodden down (as it it ought to be) to re-fertilize the field.

The January number of one of the most scientific and enlightened agricultural works of the world, viz, the Highland and Agricultural Society of Scotland, brings forth Columella and Varro in all their force. I advert to some of the main points selected for comparison with our modern practice, after the lapse of eighteen hundred years.

"The agriculture of that day was founded on the experience of Greece, Egypt, and the nations of the east. At one period, almost every Roman citizen was an agriculturalist.

"Commerce, trade and the arts were regarded subordinate to it. The greatest men sought it. The names of illustrious families were assumed from their crops, peas, beans, lentils, lettuce, grains, piso, &c. There have come down to us but five books on the subject. Columella says, that Tremellius Scrofa had rendered

agriculture eloquent. Columella flourished about A. D. 42, 1846 years ago; wrote twelve books; cotemporary with Seneca and Celsus. The Roman "Res Rustica," (farmers' business) taught tillage, vineyard, orchard, domestic stock, garden, fish ponds, shell fish, bees, poultry on a great scale, drainage on the large scale, under drains, burning the surface of brush, &c, (not paring,) preparation and care of manure. Cato advised large heaps of it. Two places in the barn-yard for it. One for first deposit, which was in time taken to the second, on a dishing spot, paved to keep the liquids; here it was well mixed, then the sides of it built up to keep it from air, and top covered with woven branches and bushes, sea-weed, river mud, all the urine well incorporated, lime made from burnt marble. Cato was asked, what was the first point in agriculture? He replied, plowing. What second? Plowing. What third? Manuring. Eighteen loads of best manure for one level acre, and twenty-four loads for an upland acre. Instead of a spade, they used a steel blade of some breadth, attached exactly like a pick-axe to a handle; with this the gardener could at a blow drive it deep into the land side from two to three feet, and do more work with it than can be done by a spade, and twice as deep. Mould boards were used on their plows, and they usually plowed nine inches deep, which is double the average depth of our American general plowing for the last two hundred years. Crop plowing, harrowing brushing. To prevaricate, was to plow an irregular furrow. If the ridge was irregular, they said it was delirious, because the straight one was called lira. They commonly planted in drills. They sowed about as much wheat per acre as we do, allowing for its tillering. They cut their wheat two days before it was ripe, because it perfected itself better from the straw. They never allowed weeds to grow, as we and England do. Beans, peas and like crops they called leguminous, from *legendo*, because they pulled them up by the roots, as we often do. A good hand made on an acre about twelve hundred bundles of hay, of four pounds weight each; about seven thousand two hundred pounds avoirdupois, or about three tons and three-quarters per acre, at one mowing. Cicero's ancestor was great at chick peas. Stall feeding used. Rennet was used for

cheese. Some pigeon fanciers raised for market five thousand pigeons.

[Bulletin Mensuel De La Societe Imperiale Zoologique D'Acclimatation, Paris, Sept. 1857.]

THE MUSK OX—(*Oomingmak*,)

Of the Esquimaux of the high latitudes of North America, as far as the Arctic Circle.

He is small in stature, but seems very large on account of his enormous coat of hair and wool, hanging down on both sides, entirely hiding his form. His throat and breast are covered with long hair; his general color is dark brown, except one whitish spot on his back, which is called his saddle. Among twelve or fifteen hundred of them, we saw but one white!

He prefers the most rocky, savage districts, feeding on herbs and mosses part of the year, and on lichens the rest of the year. When he is fat, his flesh is excellent, but at certain periods the strong musk spoils it.

Although his legs are short, he can run up rocks where no man can well follow him; almost perpendicular.

In September they assemble, not for emigration, but to defend themselves against wolves. Many stay all winter on Melville island and keep fat there. When they are attacked they form a very compact phalanx with all the young ones in the centre, and presenting on all sides their heads to the enemy. The males striking the earth with their horns and feet, the oldest ox in front, occasionally advancing, like a general, to reconnoitre the enemy. They look fierce, but the hunter may approach them very near with his gun, and on his first fire the whole herd takes to its heels, abandoning their killed and wounded. I never saw but one of them charge a hunter, and he had a dozen bullets in his body.

In winter his wool is almost as fine as silk, and could, in some stuffs, take its place.

A full grown Musk Ox—The male.

Length, from the base of the horns to the root of the tail, about seven feet.

[From the "Mittheilungen der Kaiserlichen freien okonomischer Gesellschaft du St. Petersburgh," of 1857, also "Etudes Entomologiques redigees par mon victormotschulsky; fourth and fifth years. Helsingfors. From the Press of the Society of Finnish Literature.]

THE SUBSOIL PLOW—(*Untergrund pfluge.*)

Engraved drawings of this plow, in both forms, as it has been made and used by Professor Mapes, for several years, appear in the third number of 1857. They do appear as the Professor has them, and by no means so apt for the work. But here they are! The sole plow, especially, exceedingly like that of our Professor Mapes.

Another (*Untergrund pfluge,*) assigned to Gray, seems to consist of two, lance head formed, little plows, working near each other for subsoiling. We do not see any, the least advantage over Mapes' subsoil plow. The best are Read's of 1854; its depth of work regulated by a wheel in front. Mr. Boeck, of Gallicia, has improved on Read. Boydell's steam plow attracts attention among the Russian agronomes, who wisely examine all useful inventions and endeavor to introduce them into the country.

From Mons. Motschulsky's Etudes Entomologiques, we translate the following: "New-York, July 15, 1854. Finally, I arrived at Washington, which, (I must say,) did not produce on me such an impression as one expects on entering the Capital of a great nation. Its Capitol, which is very lofty, lacks grandeur, and has no particular architectural type. All bear the seal of uniformity so marked in all the other cities of America. Nothing captivates you, unless it be the thousands of climbing roses, covering roofs and walls, between windows of some country houses. Even the Institute of Smith, (Smithsonian Institute,) that fine, useful establishment created by a lofty and generous soul, is heaped together in an edifice of such an awkward (bizarre,) construction that it more resembles a prison of the middle ages, or one of those dens of those feudal barons, than a scientific institute."

"On the 1st of June, 1854, I was in Philadelphia, the Athens of America! a fine city on the banks of the Delaware, and visited Dr. Le Conte, who received me with the greatest cordiality; made me stay with him, and enjoy his grand collection of the insects of North America."

Motschussky appears to be a perfect enthusiast in the science of insects, and we know how to value such noble efforts to gain knowledge in a matter deeply affecting our bread, wine and oil. For, by a thorough knowledge of those destructives of our great necessaries we may prevent it.

[Journal de la Societe Imperiale et Centrale d'Horticulture, Napoleon 3d, Protecteur, Paris, August, 1857.]

CHINESE YAM, (*Dioscorea Batatas.*

Experimental Garden of the Society.

The Imperiale and Central Society of Horticulture, penetrated by a sense of the importance in garden culture, and perhaps in farm culture, of this new tuber, has appointed a committee of three members to examine the subject. This committee, in order to gain all information and be enabled to give true knowledge of it, has commenced the examination as to its success in all France.

Here follows a list of questions:

BAD EFFECT OF GREASE OR TAR ON TREES.

A tree whose bark is covered with it, in its whole length, from the ground to the branches, grows feebly. Some young trees, covered about one-third of the trunk, do not mind it.

Trees with a circular coating of about a hands' breadth do not suffer at all.

Schamal, of Prussia, puts cloth bandages, wet, around the trunks, limbs &c., of those nut-trees which exude gum. On removing the bandages he finds the gum absorbed by the wet, chiefly. He then, with a brush and water, cleans the gum places thoroughly. This must be done soon.

[Bulletin mensuel de la Societe Imperiale Zoologique d'Acclimatation, Paris, August 1857.]

Extracts translated by Henry Meigs.

Experiments on acclimation of plants, at Moscow, by Nicholas Annenkow, director of the botanical committee of acclimation, of the Russian Horticultural Society, and of the agricultural school of Moscow.

The essays at Acclimation of plants, in Russia, are not new, for efforts have long been made to introduce new ones, especially,

such as are ornamental; among these, Syringa Vulgaris, Perrica, Jozikei, Caragana arborescens, Pinus cœrulea, Thuja occidentali, Pinus strovus, Æsculus, Hippocastanum, Morus alba, Nigra, Ampelopsis quineque folia, Pyrus ovalis, and many others which now ornament our gardens. But, although we have done something, it is not time to repose. What remains to be done is infinitely more than this. We give a list of plants and trees which bore, at Moscow, the winters of 1855 and 1856, they being very unfavorable to the experiment, for, in November, when we had hardly any snow at all, and the temperature down to 24° Reaumur, and then a few days afterwards up to spring temperature, which change destroyed a great many of our plants (in the open air), and rendered very worthy of notice such as resisted it. All the seeds and slips were raised in the garden of the Imperial Agronomic Society of Moscow. That garden is surrounded by shelter, which is an unfavorable circumstance for the education of hardy plants; it cuts off the winds, so that when those plants go out into the open air, they suffer proportionably. The summer of 1855 was very favorable, so that my nursery was in a perfectly good condition in the fall, viz, my Ailanthus glandulosa, Acerpegundo, Robinia pseudo acacia, Robinia viscosa, put forth remarkable shoots and great quantities of leaves. Many of these perished, however.

[Revue Horticole, Journal d'Horticulture Pratique, Paris, September, 1857.]

THE VIOLET OF ROUEN.

A zealous botanist, Mr. Viginein, points out this violet as a beautiful plant for garden borders. It is indigenous in France; it is a small, close bush; it is perennial; it bears beautiful violets in abundance, from May to October. Has been cultivated only since 1789. It belongs to the Pensées (Pansies). It is a lovely border plant, growing to the height of about fourteen inches (from twenty to twenty-five centimetres). This violet of Rouen is much sought for by the Parisian gardeners. It is rarely seen except at Mantes, Liancourt and Meaux, in the environs of the city. But its true locality is at St. Adrien, near Rouen, on the sandy shores of the river Seine.

[Journal de la Societe Imperiale et Centrale d'Horticulture, Napoleon 3d, Protecteur, Paris, September, 1857.

MINUTES OF THE SITTING OF 27TH AUGUST.

Mons. Payen in the chair.

The President—Many preventives and remedies for grape vine malady have been heralded and tried; but none have equalled sulphur, which does cure, if not by one application, certainly by a little more.

Cabbages and onions, grown in the experimental garden from seeds sent from Roscoff, Russia, were on the table.

Mons. Pissot said, these cabbages are not large, but they are much finer than other fall cabbages for the table. That the onions are distinguished for hardihood, for they stood the winter out in the fields not only without damage, but that they even grew a a little. Those from the seed, all showed the peculiarity of being double bulbs, but in the spring only one of them flourished. They were not covered at all all winter. The seed is sown in May.

Mr. George Roth, of Moscow, stated some interesting facts relative to the culture of this onion in Russia. At Roscoff, a town distant about fifteen leagues from Moscow, where are almost all the gardens which supply the markets of that ancient capital of the empire, these onions are raised on a large scale, so great is the demand for them. But notwithstanding their hardihood, the gardeners take them in.

Mons. Pissot exhibited an entirely ripe squash from seed (in the experimental garden) from China; it is small, and has but one merit, that of color, a very bright orange, and their seeds of a beautiful red.

The President invited those who had tried the sorghum, (Chinese sugar cane,) to state results.

Mons. Bourgeois had found difficulty generally in ripening their seeds, near Paris, but it was excellent for forage.

The President did not believe that the sorghum would be profitable for its sugar, in the greater part of France, but that we were not yet in possession of facts sufficient to settle the question in an economical point of view. The cider obtained from it is not com

parable to our true cider, and, besides, it is apt to become ropy, unless oak chips are put into it, as advised by Mons. Vilmorin.

Mons. Pissot thought that the non-ripening of the seeds, should not be taken as a general truth, for they had ripened in the Jardins d'Experience two years, last past, and in quantity enough for new planting.

Mons. Pepin said the seed has always ripened in the Jardin des Plantes, of Paris, when not grown more than about seven feet high.

SITTING TENTH SEPTEMBER.

A black melon, from Portugal, was exhibited, weighing about fifty pounds; ripened September third, near Alençon. It measured over sixteen inches in diameter.

The Opium Poppy was considered in reference to its culture in Algeria. Some experiments have succeeded.

The following fine pears were examined, viz: Belle de Berry or de Curé, Belle Epine Dumas, Bézi Echassery, Beurré Clairgeau, Beurré Picquery, Bon Chrétien Napoléon, Calebasse grosse, Colmar d'Aremberg, Délices d'Hardempont, Doyenné.

Mr. Fortune, the distinguished exploring botanist of England, has published the results. They are exceedingly interesting as to manures, &c., as well as to botany. We extract a few things:

"Amongst these woods I met with the chestnut, for the first time in China. This discovery was of great importance, as I was most anxious to introduce it to the Himmalaya mountains, in India. Many attempts have been made to introduce it from Europe, but they had not succeeded.

"The seeds of such trees as oaks, chestnuts, tea, &c., retain their vitality but a very short time after they are gathered, if they are not sown and allowed to vegetate. I found two species here of the chestnut; one equal, if not superior to the Spanish. The other a delicious little kind, about the size and form of our common hazelnut. Large quantities of both kinds were gathered and sent on to India, (in Ward's cases.) They vegetated freely during the voyage, and many hundreds of nice, healthy young plants reached India in the most perfect condition. The chestnut may now be considered naturalized on the hills of India, and in a few years will no doubt make its appearance in the markets amongst other fruits."

SORGHUM IN GEORGIA.

Messrs. Wiley & Halsted, of No. 351 Broadway, communicated the following extract from a business letter from D. Dickson, of Oxford, Georgia, which gives a favorable opinion of the Chinese cane, as a crop, in that State:

"I have made about two thousand gallons of syrup from the Chinese cane, and have had some of the seed ground, to test their value for flour. It makes good coarse, dark flour, equal to wheat for batter cakes. The value of the cane may be summed up as follows, viz: One acre of very rich land will make about three hundred gallons of excellent syrup, and forty or fifty bushels of seed, which is good feed for hogs, or for coarse flour. An acre is worth more to feed hogs than the same land of planted corn, besides a good crop of seed. It will make a good crop of cane stalks in a dry year, when the cane crop would fail. I think your farmers ought to plant southern raised seed, as it is perfectly matured, and one pound will plant an acre, which will cost about forty cents. I have a quantity for sale, if you know of any friend who may wish to try it."

[Journal of Education, Montreal, Lower Canada, October, 1857.]

From this, which with many valuable papers, maps, &c., we received gratis from our very valuable friend, Mons. L. A. Huguet Latour, we take the following:

THE POTATO DISEASE.

"M. Speerchneider, of Ratisbon, has found the cause of it, and the remedy, sulphur. Many experiments show it to be a microscopical parasite on the leaves of the plant. It is called *Fusisporium Solani*. The way it reaches the potato is when the leaves are on the ground. It is imbibed by the earth, and sticks to the tuber, which soon becomes rotten."

Mr. Pardee said, these cases are provided with a soil on purpose to allow the seed to vegetate.

The Chinese cane in France—It is found dfficult to ripen the seed near Paris, but the plant is esteemed for forage. It does not afford sugar.

A black melon, from seed from Portugal, weighed fifty pounds, and was esteemed very delicious.

Dr. Waterbury—The term, new species of fowl, should not be applied to the fowls with black bones. It is a variety, not a species. The bones of any animal may be colored by feeding.

WINTER FEEDING COWS.

In my own practice I have found it the cheapest plan to let the cows cut their own food. I found by feeding turnips in excess, that cows would eat up a fair allowance of uncut hay. I fed half a bushel of turnips per day, and then as much hay as the cow would eat. Turnips are worth, in the interior, just what it costs to grow them, as they will not bear transportation. Cows will consume food in proportion to exposure to cold. It is not necessary to put up cows so as to allow them to turn round. I would fasten them in stanchions, and have a very warm room. It is a question whether it would not be economical to warm stables by artificial heat. I did not use artificial heat, but I did fill in the sides of the stable with tan so it would not freeze.

The Chairman said that he had found that cows consume an immensely disproportionate quantity of hay to the value of the milk. He has always found a great economy in chopping hay. For three years past I cut hay two or three inches long, and if any is left unconsumed I am careful to clear out what is left before putting in new feed. It is of great importance to feed old cows upon cut hay; and so it is for all stock when hay is worth, as it is with me, that is sixty-two and one-half cents per cwt.

Solon Robinson—There is one very important matter in feeding cattle in winter, that as Dr. Waterbury suggests, is entirely lost sight of by the feeder. What is given to the animals is not merely what is necessary to keep them in condition as regards food, but it is also to keep up the proper degree of animal heat during the inclemency of our cold winters. If we put our stock in warm stables, the heat of their bodies is not dissipated as it is in the open air; or, if we put many animals together, they keep each other warm. But let us think where they obtain their heat. It is derived entirely from the food they eat—it is the woody fibre of the hay and the oil of the corn, burnt as fuel in the stomach of the animals that have consumed the articles as

food. Now the question of all others worthy of consideration, is this: How much of this food is necessary for sustenance, and how much is necessary for fuel—that is, to keep up the heat of the body to about that of mild summer heat? And then comes another important question: Whether it would not be more economical to burn anthracite coal at $5 a ton, than it is to burn hay at $20 a ton? In other words, to warm the stable, just as we do our own domicils, so that the beasts would absorb heat from the fire, instead of generating it all in their stomachs from food consumed. My own opinion is, that it would be not only economical to make stables warm, but to heat them by fire, and then we would give them a healthy ventilation. There is certainly food for thought in this new proposition.

It is only a question of economy as to which is the cheapest fuel, hay and corn, or wood and coal.

Dr. Waterbury—Almost every one gives too much feed at once. It is better to feed cows four or five times a day.

Dr. Wellington—Three-quarters of all hay cut for milch cows is cut too ripe. I have tried the experiment fully, and find that hay cut before the grass was fully in bloom was much better than when cut in a riper state. It produced much more milk when cut in its young and tender state. This is more especially the case perhaps, with clover than with timothy, though I would never let that mature before cutting. The seed never should approach maturity. I never would feed in boxes. The cow should be fed on a level, clean floor. Cows in Massachusetts are kept in stables, confined by the head with stanchions, and nowhere are cows more economically kept.

Manure—I would if possible, always mix with peat in the stable. A compost of three parts of peat and one part of cow droppings makes a better manure than when made of all animal excrements. Gardeners near Boston buy peat at $3 to $4 a cord, and consider it cheap manure at that.

Mr. Porter, of New Jersey—We feed hay in racks, making the cows work for all they get. We feed carrots, one peck a day. We tie the cattle in stalls by chains that slide up and down on a rod. We save manure by mixing saw dust with the droppings.

We think a stable better on a level with the earth without any cellar under the stable. Our stable floor is made of pavement and gravel.

Solon Robinson—I do not agree with the manner of feeding hay. I never see a horse or other animal feeding out of a rack where it has to stretch its neck up in a painful position, and, as the gentlemen says, "working for a living," without wishing we had a society in this country, as they have in England, to prevent cruelty to animals. There is no way so good as feeding animals on a level floor, smooth and clean. I would just as soon think of cutting up sods of the pasture and putting them in a rack as putting hay up in that way, or stuffing it in a box or manger.

Dr. Wellington—Cows should stand with their heads to the feeding-floor, held by stanchions, no partitions, no separation between the stable and floor, except a narrow board. The droppings should fall on a little ledge behind, and all the urine should run down into the cellar, where, being absorbed by muck, it never gives off any effluvia. The saving of labor and health of men and cows, is an important matter.

Dr. Waterbury—If cows are fed turnips directly after milking, the milk of the next milking will not be affected.

Dr. Smith—I have found it of great economy to feed horses upon a level floor. It is the natural position for any animal to eat, and feeding from a rack is only done by putting the horse or cow into a very unnatural position.

Mr. Porter—We feed a good deal of salt hay and corn stalks, and carrots. We should feed turnips if we could do so without affecting the milk. I never heard before that turnips fed twelve hours before milking would not affect the taste of milk. That is an important fact for cow feeders.

The subject of "Winter care of cows, and saving manure," will be continued at the next meeting, December 15.

The Japan squash, of Judge Livingston, was again examined.

Mr. H. H. Wheeler, presented red, smooth apples from a seedling tree, on his farm, twenty-five years old, which has always, before this season, produced red russets, and no smooth ones. He pruned the tree thoroughly in November, 1856. Can that have done it?

Subjects continued, viz: "Proper treatment of milch cows;" "Winter treatment of barn yard manure."

The Club adjourned. H. MEIGS, *Secretary.*

December 15, 1857.

Asher L. Smith, of Lebanon, Connecticut, in the chair. The Secretary being unavoidably absent, Thomas W. Field, of Brooklyn, was appointed Secretary *pro tem.*

Thirty to forty members present.

The Secretary read the following papers, translations, &c., prepared by Secretary Meigs, viz:

[Journal of the Royal Agricultural Society of England, No. 39. Part 1, vol. 18.]

We are pleased to acknowledge this volume, presented by the Royal Society to the American Institute, by favor of the American Minister, His Excellency, Mr. Dallas, Oct. 1857. We extract the following:

POTATO.

There appears to be a certain stage at which the potato is more liable to disease than at any other period of its growth. The month of August is the most critical time, (in England,) for our winter potatoes. But by sprouting the tuber before setting, you obtain nearly a month's advantage, so that when the disease comes, the plant is in a stronger state than it would otherwise be. We know for a fact that the same kind of potato set at the same time as the sprouted ones were much diseased, while the sprouted ones were sound, perfectly so. The Fluke potato has proved itself to be the soundest. It is very productive, grows to a large size. In many soils it retains a sweet yam like flavor, until Easter, when the sweetness disappears, and it becomes a first rate vegetable until new ones come in.

To prepare sprouts on a considerable scale, prepare an acre or two for them, a dry sandy loom. If a grain (corn) stubble, cast on your manures in February—short well decomposed horse and cow manures, thirty tons per acre! Long manures will not answer. Plow down the manure when the land is dry. Spread the manure just before you plow, to prevent waste of the ammonia,

&c. The state of perfection you must aim at, is to make your land as dry and free as oatmeal! About the begining of following April, you harrow the land, then plow it again in a dry time always, and harrow it. If it is not yet reduced to a fine tilth, you must plow it again! Now no harrowing! Set your potatoes for sprouting—the earth being left as light as possible. When sprouted set them in your field, by means of a spade, making a two inch deep place for them. When a tuber has many sprouts cut them in two lengthwise, never crosswise. If the land be not rich enough, put a little guano below the potatoes, not on them. Some of your folks never use a line, they take great pains with the first furrow, and then keep an eye to it. About a fortnight after the setting, a small light harrow is drawn over the field to kill weeds—the teeth of this harrow are iron, about three inches long, set in wood, and is drawn by a man instead of a horse. When the plants are distinguished in the rows, flat hoeing begins. In fine weather once, if showery two or three times!

When the land is clean of weeds "moulding" begins—lately done by a small iron plow with moulding boards, drawn by one man, while another holds the stilts, (plow handles). The best time for this operation, is either early in the morning or late in the evening—say before 8 o'clock A. M. or after 6 o'clock P. M., for then the plants have drawn up their leaves, and so escape injury from the operation; for if done in the heat of the day, the rootlets would be scorched and the plants would droop.

To ensure success and command high prices, the sprouts should be at least one inch long, and strong, as large as the stem of a tobacco pipe, with their tops just covered with green buds, and just bursting into leaf!

You must keep this crop free of weeds if you have to hoe it every day!

Let this sprouting system be tried and the saving of food will be enormous!

On Farm-yard Manure, Drainings of Manure Heaps, and the absorbing properties of Soils: by Dr. Augustus Voelcker.

It is a prevailing opinion amongst farmers, that the peculiar smell which emanates from dung-heaps, is caused by the escape

of ammonia, and that the deterioration of farm yard manure is due, in a great measure, to the loss of this most fertilizing substance. But this "volatile carbonate of ammonia" which appears in putrefying organic matter, is so inconsiderable in fresh as well as in fermented dung, in all stages of decomposition, that it is not worthy of notice in a practical point of view—so that the escape of ammonia cannot be the cause of manure heaps losing much fertilizing power, even by considerably long exposure to the atmosphere. But in the interior of a dung heap, where the heat is often from 120 to 150 degrees of Fahrenheit, the ammonia is given off so abundantly that its presence here becomes patent by its characteristic pungent smell. Fortunately, the external cold layers of dung heaps act as a chemical filter, and retain the ammonia within so effectually, that even a delicate red litmus paper is not altered in the least. As the faintest traces of ammonia turn reddened litmus paper distinctly blue, it is plain that however strong the smell of a dung heap may be, it cannot be due to the escape of ammonia.

The London Farmers' Magazine, for Oct., 1857, says that the above article, by Voelcker, is "the article" in the Journal of the Royal Agricultural Society, last volume, and that farmers ought to read it.

BAD EFFECTS OF CLOVER HAY ON ANIMALS.

Some late writers have taken the position that clover-hay produces a most injurious effect on domestic animals, particularly horses; and that to this cause the great increase of diseased horses is to be attributed. We lately heard a farmer affirm that he believed the introduction of clover-hay into general cultivation the greatest curse yet inflicted on the country, and assigned as a reason for this singular opinion, its effects on animals when used as a fodder. Late English writers have attributed to this kind of hay the prevalence of *hove* in horses! and the great increase of other diseases that affect the respiratory organs.

This is a most important subject, and should receive a full investigation. Clover is too important a plant to be discarded or

condemned except upon the most satisfactory evidence. We have for thirty years never known any thing but good from clover.

The last is from the Ohio Valley Farmer. We say look!

H. MEIGS.

[Bulletin Mensuel De La Societe Imperial Zoologique D'Acclimatation, Aout, 1857. Paris.]

CATTLE IN ALGERIA.

A full discussion of this interesting subject has been had. Beef and other animal food are absolutely wanted there; scarcely any beef or veal, of course, can be obtained. The Arabian horse is multiplying rapidly, but horned cattle not. The Arabs love the horse for war, and as a sort of religious duty! not always observed. But this is not so with beef. The cattle of the country are far below those of France, Britain, &c.; they are a confused mixture, small, stinted, pretty strong, of all shades of color and hair. Such are the poor little stock of Algiers. Constantine, Boufarik, (Abiot, on southern Atlas,) Berragouya, Kroubs, Guelma—all these are so few that the Arabs have little or no beef or veal. These little creatures are harnessed to drag heavy loads. We are told that they are not difficult to fatten. Some learned agronomes think it best to ameliorate this native stock by itself, instead of trying it by imported stock. The African cow is certainly a very poor milker, seldom reaching six quarts a day, worth ten cts. a quart. Mr. Trotter, at Rassanta, in the Mitidja, not far from Algiers, near the sea, has about eighty head of all ages.

At Mustapha, Mr. Letheule, has charge (and he is very intelligent,) of about fifty milch cows, which average six quarts, and bring 60 cents a day the year through. But the scarcity of milk is great among the people.

The difficulty is feed—the great heats and droughts destroy green forage, and the stock do not flourish on that which is dry. Their stomachs are much troubled with it. Irritation is produced by it. So troublesome is this very dry fodder, that Dr. Millon, chief druggist of the hospital of the Dey, at Algiers, has on experiment, recommended the pears of Cactus, commonly called there "Barbary figs," for cattle feed. They are abundant in spite of heat and drought. He tried it for eighteen months on a cow from Britanny, and found her in excellent health and giving good

milk—fed on these figs with some of the dry fodder. One kind of these figs has no prickles. Millon cut them up, for the cow. However hot the air, in and out of the stables, is by day, it always becomes cool at night, and the cattle are let out to enjoy it.

Pork, is as yet, very little raised in Africa—there are only seven or eight thousand of them, and these belong to the European population. Before France had Algeria, the hog was unknown there! The Mussulman religion forbade the use of its flesh for food! The Arabs detest pork, which they call *allouf!* by which they express their most profound contempt.

There are many wild boars feeding on acorns, &c. Some colonists have let their hogs imitate the wild ones, by driving them to the forests for acorns, &c., on which they get fat in a month. I have seen some of the hogs grown from crossings with the wild ones, and these are very hardy and do well, nor are they wilder than the domestic herd which they live with. Hogs are readily thriving here when imported, and pork will become a great business here. These hogs are fit for market at one year old, and some before that.

[Journal De La Societe Imperiale et Centrale D'Horticulture, Paris, July, 1857. Louis Napoleon III, Protecteur.]

Extracts translated by Henry Meigs.

Report of the committee on two American works, by the chairman, Mons. Duchartre.

The report of the Commissioner of Patents and of the Agricultural Society of the State of New-York.

These works are due to the Vattemare exchanges.

The 14th volume of the Transactions of the New-York Agricultural Society, has scarcely any other interest than a local one. It is in fact composed of, for the most part, the reports of the various committees on farming and gardening.

It contains however the first part of a great work, interesting to farmers and gardeners, out of America. It is a history of all insects injurious to vegetation, or useful to it, in the State of New-York. This first part contains 185 pages of a compact edition. Mr. Asa Fitch, the author, treats of those insects which attack the apple, pear, peach, plum, cherry trees, and the grape vine—

the native fruit trees, the forest trees, and lastly garden plants. Numerous wood engravings facilitate the meaning of the text.

In *September* we take the leaves off the vines sufficiently to bring the sun to the grasses, in order to help their ripening. This is done because it has been proved that where leaves were few and the sun penetrated, there the grapes ripened soonest.

Now set out in the nursery, all the seedling plants sound last June.

THE CROPS OF FRANCE.

Spring was favorable to all the vegetables. The night of May 5th to 6th, the grape vines, in low places, were touched by frost. But in fifteen days they grew again, and are as beautiful as others which were not touched. For a long time we have not seen a crop so advanced and in such good condition. Our wheat is superb and full of grain. The harvest will commence on the 15th of July.

Rye and barley are also fine and abundant. The potatoes are still finer than the grain and grasses, and in great quantity. They grow astonishingly and abound in flowers, which they have not done before for ten years past. Our pears grow only passably. But fruits, such as cherries, plums, &c., abundant; apples, scarce.

[Journal De La Societe Imperiale et Centrale D'Horticulture, Napoleon III., Protecteur. Paris, Octobre, 1857.]

The Transplanter of Baron Adol. Von Call, of Botsen, from the (Monatschrift fuer Pomologie.)

This implement transplants nursery or garden plants so as not to arrest their vegetation a moment. It is a cylinder of the required size for the plants. It is split from top to bottom—the lower edge sharpened inside—the upper edge made strong by a rim. It is made of sheet iron or stout tin. The edges of the split are a short distance apart. To one side of the split there is secured a strait metal rod, long enough for use. On the lower edge of the other split side is attached another rod, which is connected at the top of the cylinder by a pin, thus rendering the two rods like a pair of scissors. The tops of the rod made convenient for handling. This machine being put over a plant, is pressed down by the operator's foot, as deep as necessary, then he uses

the scissor handles to draw the split together, thus compressing the soil within so as to retain it in place. Thus he transports it to a hole ready to receive it. All this occupying a very few minutes.

The cylinder used by Baron Von Call, is

High, ...	6	inches and a half.	
Diameter, ...	5	do	do
Breadth of the split.	1	do	do
Length of the scissors, ...	20	do	do

Thickness of them at top—nearly half an inch.

Thickness of them at bottom—nearly five-eighths of an inch.

[Bulletin Mensuel De La Societe Imperiale D'Acclimatation, Octobre, 1857.]

THE BAMBOO, IN ALGERIA.

France is trying to make the Bamboos of the Orientals grow in Algeria, with good prospect of success, including with the great Bamboo, some small kinds from the Himmalaya mountains, growing near the snowy region. These are only as thick as a finger and about 5½ feet high.

BARN-YARD MANURE.

The subject of the day—*the winter treatment of barn-yard manure*—was then taken up.

Professor Mapes said, that it was a well understood fact, that manures exposed so as to allow their fluid ingredients to pass away, lose in that fluid a large amount of soluble inorganic material susceptible of being taken up by plants. The loss of the ammonia from a manure heap, is an evil. The addition of swamp-muck renders manure doubly valuable. We ought to lose no part of the manure that is either volatile or soluble. In Flanders, manure is carried to the field from the cistern in solution, and until it is in a condition to pass into solution it is not used. With us the question would be one of economy, as the expense of manipulation is heavy. In this plan, whatever be the chemical theory, no ammonia is given off, for the instantaneous employment of water prevents it. There ought to be no waste of either volatile or soluble matter. The box-feeding process in England proves, that the plan of spreading manure at once, is not nearly so economical as that which is properly manipulated.

The result always is, that even with the most clumsy composting, an increase of value is obtained, beyond the power of the two used separately. One cord of manure rendered fluid, will represent two and a half cords. But the question is, whether the expense of the manipulation does not neutralize the advantage. You may cover the surface of a field with shavings, if you like, and the soil will be improved. Mulching with leaves, or the salt hay of the meadows, is not to be mistaken for the effect of manure which passes into the soil by solution. The professor would use many things as a top-dressing, but not stable manure, which is very volatile, especially in a long state.

In the winter treatment of barn-yard manure in the open air, if you will watch it, you will observe the decomposition and escape of gases. It is not so valuable as manure treated under a shed. It evaporates rapidly if exposed. If placed under a shed, and allowed to become short very rapidly, without becoming heated, its value is enhanced. The object is to get it in solution, and not at the same time in a volatile state. A cistern is to be employed, supplied with a necessary quantity of water. The two conditions are air and moisture, and then the soluble materials run through the solid material to the cistern. A minute amount of sulphuric acid may be added to the cistern, which converts the carbonate of ammonia into the sulphate. This plan gets rid of the immense labor of turning over the materials too fibrous to admit of manipulation, that might render it homogenous. The trouble and time and loss of handling over, is got rid of by the arrangement of a cistern at the foot of the manure heap. It was said that Liebig was all wrong, that ammonia was not so especially useful; and now, on the other side, Dr. Voelckel assumed an equally fanatical opinion. Both parties had assumed a too exclusively one-sided view of the truth in this matter. Organic materials were as necessary as inorganic, for the growth of plants. But both must be placed in such a condition as was favorable for assimilation by the growing plants.

The professor was very satirical upon the folly of those farmers who suffer the liquid drainage from their manure heaps to run down a hill and across the road, before their farm yards. He

mentioned a locality, where the number of farms might be counted by the number of rills of this nature across the road through the country.

Dr. Waterbury observed upon the peculiarity of American winters. Very little chemical change took place upon heaps of manure in the open air during winter. Where land is cheap, it is better to take a longer course, say, for instance, to put manure under the Indian corn, and let it compost itself. The length of time required for the decomposition of organic materials in the soil, depends much upon the question whether there be at the time a growing crop above such materials. The roots that are above rapidly remove the carbonic acid. In a wide system, composting is not so profitable, and with two hundred or three hundred acres, a man can do little more than get out his manure.

Professor Mapes said there was no winter inside of a compost heap; the thermometer proved, that if there were any depth of manure, decomposition did go on, even in the open air. The yield will be twenty per cent. greater where short manure is used instead of long manure. That has been demonstrated. On clay soils, long manure, rendered pulverulent by the frost, is economical. The mechanical effect is, that the straw renders the soil accessible to air, but that is a question of mere mechanical treatment. The method of leaving a heap to become short of itself, will not prove economical. As to the labor of composting, it is not increased. You have got to have some place for it. You handle it but once, and have not to touch it again. It is a positive saving of labor.

Mr. Bergen, of Gowanus, said, that in his locality, both long and short manures were used. Long manure put immediately under the corn, would not answer. The soil was a sandy loam. That, perhaps, made some difference. Something had been said about clover. We could not depend the first year upon our timothy crop. Clover is a very troublesome feed, especially for horses. It grows very strong on the ground, and is not so easily cured as timothy.

The Chairman said he had a farm of about forty acres; he had kept fifteen cows on it, had hay to sell, besides other crops. He described his manure heap. He had done all he could to prevent

it from heating under cover. Manure in the open air was only fit for grass. When made under the barn, the land would not easily forget such a dressing. His land was so rich that the clover bothered him—fifteen tons on two acres. It was mowed and cured in the cocks, not spread at all. It kept ten cows and two horses all the winter. He could not see the advantage of plowing clover in, unless when green, and thought the fluid from clover was worth no more than water.

Professor Mapes said he had been misunderstood. It would be found that water which had been allowed to transude through a muck heap, would not come out water.

Dr. Wellington described his plan of a cellar for manure under a barn. The walls were pointed. Every second day he added to the heap of manure that cellar contained. Prepared as he prepared it, he would prefer his compost to any material he could name. It was so situated, that all the cattle droppings fell into it. It was never exposed to currents of air, and never frozen. He never had any long muck. On any rainy day, when work outside could not be done, his workmen could well employ themselves in turning over this heap. As to drying, when urine is not available, even water is useful. The animals stood on a floor over a cellar ten feet deep, and he was convinced that no better plan could be adopted, to economize manure.

Subjects for next meeting, (same,) viz: "Proper treatment of milch cows;" "Winter treatment of barn-yard manure."

H. MEIGS, *Secretary.*

January 5th, 1858.

Present—Messrs. President Pell, Adrian Bergen, of Gowanus, Dr. Church, Prof. James J. Mapes, Mr. Lawton, of New Rochelle, Prof. Nash, Dr. Waterbury, Messrs. Veeder, William H. Weeks, Pardee, Thomas W. Field, of Brooklyn, John M. Bixby, Lowe, Dr. Smith, Dr. Edgar Peck, of Long Island, Messrs. Stacey, Chambers and others; thirty-four members.

Robert L. Pell, President of the Institute, in the chair. Henry Meigs, Secretary.

According to the standing rule, miscellaneous matter is considered during the first hour.

The secretary read the following translations, &c., made by him, from the latest works received by the Institute, viz:

"*Paris Dec.* 1, 1857.

"*Mr. President:* I have the honor to inform you, that having acquired a large garden in a delicious situation, at Hyéres, in the Department of the Var, I intend to make it an experimental one, to grow and raise seeds from all such seeds, plants and exotics, which can be made to do so in this northerly position, so that those which abound in southerly regions may be acclimated here. And for that end, I offer to all horticultural and agricultural societies, and to botanical societies, and to individual amateurs, who shall send me seeds, plants, &c., &c., to grow them, and to give to the donors half the profits I can make of them.

"I am a proprietor and no dealer. My sole object is to render service to the world, by developing and propagating rare and useful plants. I have an able gardener to take charge of everything. Address me, (LUCAS,) at No. 20 Rue Basse du Rempart, with seeds, &c."

[Extract from the report of the Horticultural Society of Saint Germain en Laye, twelfth exhibition, sitting of 22d September, 1857.]

"His excellency, the Minister of Agriculture, and the Agricultural committee of Toulon, award M. Lucas much praise for his true, living and imperishable Herbariums. Toulon gives him the medal of honor."

SEA WEED—(*Marine Algæ.*)

The very valuable Society of England "The Society of Arts and of the Institutions in Union," London, 1857, says:

The subject has been lost sight of by the council this year, except that information is invited as to the methods of the Chinese in preparing sea-weeds for food.

Sea weed occupies the largest geographical range of any known vegetable, and as yet applied to the least purpose. A valuable paper recently appeared in the Edinburgh Philosophical Journal, by the scientific Dr. Davey, F. R. S. Dulse, or rhodomenia, Palmata, of Greville, is called also Dylick, or Dellish, or dullisg or water-leaf. It is nutritious but sudoriffic—smells like violets—is used for food by Northern nations. The people of Ireland eat

it raw; it is mucilaginous and then a little acrid afterwards. The Icelanders wash it thoroughly in fresh water, dry it in open air, then it becomes covered with a white powdery substance, which is sweet, like sugar, and palatable. They pack it in close casks and keep it for eating, with fish and butter, or by the rich people boiled in milk with some rye-flour. In Kamschatska, they make a fermented liquor from it. It is eaten in considerable quantities on the coasts of the North of Europe, and in the Grecian Archipelago. Cattle are very fond of it, and deer eat it with so much avidity that they are occasionally drowned by going too far for it at low tides. The cattle and sheep of the Western Hebrides, make most of their food for winter of another sea-weed—the Fucus vesiculosus, of Linnæus. It is good manure and makes kelp. This sort is esteemed in Iceland. In Australia, the natives use the Laminarium potatorum for several purposes, besides food, instruments, vessels, &c.

The Royal Society of Van Dieman, say that Algæ cast on the shores of Sloper island, produce a pure and delicious jelly used for years. Bull kelp is dried, then roasted by the natives, then soaked in fresh water for ten or twelve hours, then it is fit to eat. Mr. Howie found it exceedingly nutritious and fattening. The pepper Dulse (Lamonica pinnatafida of Lamouroux) has a pungent taste, and is used as a condiment for other sea weeds. There was formerly a cry in the streets of Edinburgh and Glasgow, "Buy Dulse and Tangle," like that of water cresses now. The long sea cat gut of Orkney, (Chorda filum,) is used for food and fish lines.

The Iridæa Edulis, of Bovy, resembles roasted oysters in taste. The Chondrus Crispus, or Carrigiea moss, or Irish moss, is bleached and sold in commerce for making blanc-mange and jellies, in place of isinglass. It contains nearly 78 per cent of mucilaginous and gelatinous material. A like sea weed is found at the Cape of Good Hope, and used similarly.

The Laminaria Saccharinæ, is highly esteemed in Japan—it is sugary. Millions of people in Japan and the Kurile islands, use it as a favorite dish.

The Agar, of Malay, is extensively exported to China—it forms sweet jelly. The Chinese lanterns are saturated with this gum to make them transparent.

Wherever these sea weeds with their Iodine and Bromine are used, there is no Bronchocele!

Mr. Meigs read the following translations and extracts, made from articles received by the Institute, by the last steamers: .

One of these mentions the manufacture of parchment paper. This is made by dipping common paper in strong sulphuric acid, diluted with one-half its bulk of water, being first allowed to cool. The paper is then instantly washed free of its acid, first in plenty of water, and then in a weak solution of ammonia. A band of common paper that will break with a weight of seven or eight pounds, will sustain a hundred pounds after being thus prepared and allowed to dry.

The rationale of this is, that the acid changes the fibre of the paper material into gelatine, somewhat similar to the substance of skin parchment. This conversion is not any more remarkable than the conversion of cotton into a substance in solution with ether, that forms a tough skin like human cuticle, when it is spread out in the open air. The paper which gives an account of the parchment paper thinks the discovery will lead to many useful purposes.

WINTER FEEDING STOCK.

This important question was adopted for discussion at a former meeting. It is one of the most important that has been talked over, since the waste of feed is almost or quite equal to its consumption—taking the whole country through. The most economical kind of food for stock, as well as the most judicious preparation of it for different classes of domestic animals, is just what every farmer should absolutely know—not guess.

The few thoughts elicited here to-day, at this Club, should be counted as seed planted for them to cultivate.

Dr. Waterbury—I have some doubts about the economy of cutting food for cattle to the extent that it is done by some in this country. I have seen lately an account of undigested cut

corn-stalks in the rennet. I once lost a fine heifer, which showed upon dissection, cut straw in the small intestines.

Dr. W. then proceeded to illustrate upon the blackboard the form and connection of the different receptacles of food in its passage through the stomach and intestines, and how it may be carried through undigested, as it naturally will be when the proportion of more woody fiber is too great for the nutritious matter. Although cutting or chaffing woody fibre may enable animals to eat it, it does not make it nutritious, and however necessary a small amount may be to mix with food, it may be given in too large quantities. He thought some of the physiological studies connected with this subject are very curious, as well as useful.

He illustrated a case of a bullock that had swallowed a table-fork, the tines of which came out through the side and remained fast, the handle having become encased with a bony substance where it was fixed in the ribs. This was one item of proof that cattle will swallow substances that have no value for food, for instance, the dry butts of cornstalks and corncobs.

Solon Robinson—I only wish to enter my protest against all expenditure of money for mills to grind cobs, and all time to convert them into meal, as worse than useless. The only value of cobs is for fuel. They are not even good for manure until burnt, and for food are no better than saw-dust, or any other woody fibre ground fine. It is well enough where straw or hay cannot be had to feed with the corn, to grind cobs; but as a general rule it wont pay, because they are not nutritious, and only serve to distend the stomach, and if crowded upon it by the anxiety of the beast to get the little meal of the grain with which the cobs are mixed, too much of the cob portion may be eaten, and the health of the animal injured.

Prof. Nash—I wish Dr. Waterbury would explain what he considers woody fibre, and its effects upon the animal; and of what value is the woody fibre, of straw; and whether he would prefer to separate the useless from the valuable portion.

Dr. Waterbury—I do not think it would be good policy to exclude all woody fibre. In the butts of stalks and in cobs, there is too much woody fibre, and all animals will reject them unless

tempted by the addition of meal. I think the instinct of the animal tells us what is nutritious and what is not. A few years ago the French thought they had made a great discovery by making horse soup with Papin's Digester. But in a little while it was found that it was not a suitable food for man. It did not contain all the requisites.

Prof. Nash—It is manifest that nature intended that beasts should eat woody fibre, and that it is necessary to a certain extent. Hence straw is valuable. So corn cobs may be. But it depends upon the other portions of the feed whether it will be profitable.

Wm. Lawton—I quote some statements of Judge Peters. He was of opinion that fifteen lbs. of cut hay was equal to twenty-five lbs. uncut. It should always be fed systematically in regular quantities. He thought a peck of salt to a ton was enough. The economy of cutting feed is undoubted with me. I cut my hay three inches long. A bushel weighs 5½ lbs., if heaped and lightly pressed. To each horse or cow, Judge Peters fed three bushels a day, at three feeds, in troughs or boxes. Over-salting feed diminishes nutrition.

Prof. Nash—I grew up a farmer, and never shall out grow it; and I contend that farmers are possessed of better common sense than mere theorists. Judge Peters, in some things, is in error. I contend that well made June hay, uncut, if judiciously fed to cattle, will be consumed and digested, all of it, or as near as in cut hay. Still I approve of chaffing all coarse hay and straw. If all farmers should feed all their cattle food so as to save all the nutriment, it would nearly double the value of their products.

Mr. Bergen, a Long Island farmer, said that he was satisfied that cob meal was not valuable, because no animal will eat cobs in their natural state. It is just so with the woody fibre of butts of corn stalks.

Prof. Nash—Because the horse will not eat cobs, does it prove that they are not valuable? Oats are the favorite food of horses. Yet a horse would not probably eat the hulls of oats if separated from the meat.

Mr. Bergen—In this latitude horses prefer oats, and will always leave corn for oats. It is, perhaps, because they are more used to oats.

Dr. Waterbury—I don't believe that woody fibre will sustain any animal. Nothing but insects can get nutriment out of mere wood.

Solon Robinson—It is all owing to what food horses are accustomed to, as to what they will prefer. At the south, where horses are almost wholly unacquainted with the sight of oats, I assure you that a horse will leave oats for corn quite as readily as he will do the reverse of that here. In some large districts the entire food of horses is corn fed in the ear, and corn leaves, called blades. Another very important question was now called up by T. W. Field, viz:

THE TREATMENT OF MANURES.

Mr. Field—To talk intelligibly about manure, it is quite important to know what manure is. Manure, if intended to convey the idea of food for plants, is often a terrible misnomer. Fresh dung, or fresh urine, is never food for plants. There is no element in the fresh excretia of animals in the undecomposed vegetable waste of farms, such as straw, stalks, weeds, etc., or in the muck and peat of swamps that can afford sustenance to vegetation. Plants can never appropriate an element until it is prepared for them. They have no digestive organs, and the change in their food must be perfected in the soil, which is at the same time the granary and the stomach of plants. The waste of manures can take place only by two methods.

First. By solution in water, which may run off upon the surface or sink into the ground.

Second. By their preparation for food of plants prematurely, or in such positions that plants are not present to appropriate them, which preparation always reduces manures to gases. Now let any one thoroughly comprehend these positions, and he will never be at a loss to discover whether his manure is exposed to waste.

Until manure has undergone such fermentation as to produce sensible heat, there can be no loss of the essential elements of vegetation by gaseous escape. If manure lies upon an impervious bottom, there can be no waste by the soluble elements passing downwards into the soil, and if its position is such that no water

can flow from it, no waste can take place by any amount of saturation. While saturated with water the putrefactive fermentation can not proceed; and the offensive smell that issues from it is of no sort of consequence. The escaping gases from fresh or saturated manure form no part of the gaseous elements which are the food of plants.

The great objection to the too abundant saturation, is not only the excessive weight to be removed, but that the preparatory fermentation, which is not exhaustive, cannot proceed. When manures are removed to the soil, they are intended to fertilize before fermentation has taken place, and partially spread, so that the heaps are too shallow for it to commence. There is no essential waste during winter, except it may be by solutions from it flowing off upon the frozen surface, before they can sink into the soil. The rains do not materially affect them while the earth is thawed, as what they dissolve sinks into it.

Professor Voelcker, of the Agricultural College of Cirencester, England, and John Johnston, an extensive farmer of western New-York, have, almost from the antipodes, simultaneously announced, one the theory and the other the practice of this principle, and its seeming antagonism to the favorite sentiment, has elicited great needless discussion. They have both asserted that there was no essential difference in the effect of manures carried in fall or winter to the fields to be fertilized, and those made under shelter or in heaps in the yard; and in this they are right, when they refer to manure uncombined with foreign substances, and exposed to fire-fanging or saturation. But when they assert the same regarding those manures combined with foreign substances, which they reduce to a condition for pabulum, they are wrong. Manures removed to the soil from a yard saturated with water, are not, nor ever can be, distributed equally over the soil. Clumps and pastey masses are flung around, with dry and saturated stalks and unrotten straw, which not only afford unequal nourishment to the soil when prepared by putrefaction, but actually destroy most of the germinating seeds in their vicinity, by the virulence and abundance of their first crude solutions. Now, Mr. Johnston's success, and Professor Voelcker's truth, consists in a condition being met

which they had entirely overlooked. This condition I had observed twenty years before Professor Voelcker and Mr. Johnston announced the principle with which it is connected. During the winter the frosts and winds have disintegrated and dried these masses, until they admit by their pulverulent condition of being more thoroughly distributed over the soil. We then approach the annunciation of this maxim.

Manures, to produce their best effect, must be thoroughly distributed over and through the soil. Reduced to its finest and most pulverulent condition, each small particle of manure should be divided from its fellows by many particles of soil. How to do this without waste, is the great secret; and the methods are various. 1st. By frequent turning. 2. By composting with swamp muck, peat, straw, soil, and other crude materials. 3d. By returning the water that flows from a heap to its surface, by pumping and otherwise. 4th. By combining the dung of different animals, as the easily heating dung of the horse, with the cold and unfermenting dung of cows and swine. 5th. And worst and most common of all, by allowing the dung and litter of the stable to decay undisturbed in heaps, heating and fire-fanging to ashes in the centre, and wasting many times the value of that which remains. I do not propose here to analyze and compare these various methods, but simply to endeavor to clear away the mist which surrounds some simple principles.

Amid all the discussion of the value of manures and their treatment, their creative power of inducing the sustaining principle of other substances, has never been treated of. No wonder is excited by the fact, that a small piece of fermented bread placed in the centre of a batch of dough, will excite the vinous fermentation, and entirely change the chemical condition of the whole mass. In the same manner may a comparatively small portion of actively decomposing matter reduce a large bulk of inert and even poisonous substances to an active and valuable agency in fertilizing the soil. Many a man has laboriously hauled the muck off his swamp upon his field, and with disgust and chagrin beheld the death of every vegetable in its vicinity. The heat and active fermentation of dung mixed with muck, would have excited a

kindred fermentation, that would have rendered it fit food for plants. All other inert, or slow decaying, or acid matter would have been treated in the same manner. The changes they would undergo are not a little remarkable and instructive. Let us trace them for a moment. The dung having in the intestines of the animal undergone partial decomposition, is more nearly ready for complete putrefactive fermentation, and commences to heat as soon as its superabundant water has been pressed out. The cause of the heating is twofold. 1st. The combustion of decay or absorbing oxygen. 2d. The compression or lessening of bulk as the heap settles down. As soon as the heating commences, the carbon, the hydrogen, and the nitrogen lose their hold upon each other, and are free for new associations. The carbon unites with oxygen, and carbonic acid appears. The hydrogen and nitrogen unite, and ammonia appears, for it is only until rotting or decomposition takes place, that ammonia (that much talked of but little understood substance) is to be found. And now the game is opened, the mass of muck or other inert matter heated many degrees above blood-heat, is prepared, by the expansion of its particles, to receive a new influence. The tannic acid, that has preserved its liquid and carbonaceous character so long, is met by the ammoniacal gas escaping from the rotting dung, and neutralized by this potent alkali to a harmless agent. The muck now greedily absorbs many times its bulk of ammoniacal vapor, and becomes not only a vessel for its preservation, but is itself rendered a soluble carbonaceous substance, fitted for giving up its elements to living plants. Not a bubble of the precious nitrogenous vapors, not a drop of the liquid gold of the compost can now escape. But the muck accomplishes more than its hunger and thirst dictates. It operates as a divider, to separate the particles of manure, and render them better fitted for complete division and distribution in the soil. Now, whether one very imperfect method of using manure is better than another very imperfect method, ought not to occupy the attention of any man. Whether John Johnston could obtain equal, or even better results, from fresh manure carted to his fields in winter, than he could from it hauled from his barn-yard half decayed in spring, or from the same source, piled with care and frequently turned, but still so as

to lose by that very turning a great part of its value, ought not to be the question; but whether he might not have employed his fresh manure to multiply itself many times, to render soluble and fit food for plants, inert and vicious substances. Of the second condition of loss of value in manures, not much need be said. As I have before stated, the four great gaseous elements of plants, oxygen, hydrogen, nitrogen, and carbon, are combined in such proportions and relations in disorganized plants, in ripe or dry vegetables, and in fresh dung, and half rotted plants, as to be totally unfitted for food for green and living ones.

Now the moment that fermentation, heating, or decay commences, these gases separate from each other, and are set free for new combinations. As they occupy vastly greater bulk than before, they burst forth and escape, unless detained by some absorbing substance, that would hold them until combined again. The carbon unites with the oxygen, and combustion takes place, precisely like the burning of charcoal in a flame, and the result is the same, ashes. The ashes of fire from the hearth, and the ashes of fire-fanged dung, are precisely similar. By this fire-fanging, the hydrogen and nitrogen, which would have formed ammonia, have nothing to detain them; the carbonaceous matter which forms their natural storehouse, has been burned up. There are but three methods of preserving manure from this species of loss: 1st. Saturation with water. 2d. Drying in the sun. 3d. Composting with considerable bulks of inert matter. All these are objectionable, but the last presents the vast advantage, that while the bulk is greatly increased, the value is not diluted; that every pound of the compost is equal to a pound of the original.

I am convinced, therefore, that the whole subject of manure might be condensed into the following propositions:

1. Manure does not waste so long as it is unfermented and undissolved, and these conditions are effected by drying, or by saturation, by spreading too thinly for heating, or by heating in contact with absorbing substances, (opposite conditions, and yet not different.)

2. Fresh or unfermented excrement is unfit for food of plants, and requires a new combination of elements, for which time and heat and moisture are requisite, and to which saturation and dryness are equally opposed.

3. Fermenting manure in contact with inert matter, has the power of neutralising vicious properties, (as the tannic acid of peat, and the peroxyde of iron,) and of dissolving and rendering soluble properties that were otherwise locked up.

4. The waste of manure is effected in only two ways; by the escape of its gaseous elements into the atmosphere when heating, and by the dissolving of its soluble salts in water that flows away. Any method that prevents these is valuable.

5. The creative or effervescing effect of unhurt manures, is more valuable than the original matter, and is capable of multiplying its value many times.

6. The value of any manure is in the ratio of its division through the soil. And the golden rule of farming is, small quantities of manure well divided and intermingled with the soil, will produce better crops than large quantities not well divided.

Mr. Meigs reminded the Club, that since New-York was first visited, two hundred and fifty years ago, by Hendrick Hudson, two winters have been distinguished for such extraordinary mildness, that there was no ice in the Hudson river the whole winter. Albany, then Fort Orange, was threatened with destruction by the Six nations of Indians, in 1698. Our Governor being informed that the Indians had determined to destroy it about the middle of February, when the river was always covered by ice several feet thick, nevertheless prepared a small army to go there; and, about the eleventh of February, sailed in sloops to Fort Orange, and it was saved. The Six nations believed that this wonderful mildness was given by the Almighty to save the white man, and abandoned their deadly project. Once more, in 1756, Albany was a second time threatened with destruction by the Six nations of Indians. And some three hundred soldiers sailed from the city of New-York to Albany, on the twelfth and thirteenth of February. No ice in the river then, nor all winter. The Six nations recognized another miracle. Since that, no such mild weather has occurred. But as the general average of temperature has for centuries not varied so much in any country as to destroy its vegetation; and as our giant tree of California, some of South America, of Teneriffe, of Australia, and of Africa have

lived for three to four thousand years, they are standard evidences that the changes of temperature cannot have been great, or they must have been destroyed.

When Strabo, the most faithful of writers, described the climate of England, at the site of London, eighteen hundred and forty years ago, so exact is his statement of the fogs and drizzle, with an occasional gleam of sunshine, περι την μισσημβριαν (about noon-day,) I feel disposed to drop my long habit of keeping a metereological table.

The seasons have so far been adapted to our use with a precision which we may religiously wonder at; and the amazing mechanism of our world, which the illustrious astronomer La Place, in his Mechanique Céleste, demonstrates to have maintained its heavenly motion for the last two thousand years to the hundredth part of one second, or the tenth of a wink of the eye!

Dr. Peck—Fourteen years ago we had no frost in the ground, and a great deal of plowing was done in January. February was a hard month, and the Spring was backward.

Solon Robinson—The winter of 1827–8, in Cincinnati, was a very open one, and the following Summer a very productive one of all tree fruits. I think next Summer will be so, since there was a great growth of new wood, and that has become well ripened.

Mr. Wm. H. Weeks, (deaf and dumb,) presented syrup made by him from Sorghum (Chinese sugar cane,) last fall, at Yorktown, in the county of Westchester, New-York, by very humble means, viz: The juice was expressed from the canes by two planks and their leverage. On tasting this syrup it was found fully equal in richness to any molasses.

Wm. Lawton, of New Rochelle, presented apples, called longitude apples, because of their being ordinarily marked with black *colures* from stem to flower point—some perfect, others partially marked, many unmarked—the skin yellowish.

Mr. Meigs said that he had noticed this singularly striated apple in our markets for about ten years past.

Alanson Nash requested the Club to take up, at the next meeting, the interesting subject of the red cattle of New England, a

race which has been here 200 years, acclimated, fine forms, great strength and admirably uniform in color. Adopted unanimously. Also continued, "The proper treatment of barn yard manure in Winter."

The Club then adjourned.

H. MEIGS, *Secretary.*

January 19, 1858.

President Pell in the chair. Dr. Waterbury, Secretary *pro tem.*

Present—Messrs. Pell, Prof. Mapes, Robinson, T. W. Field, of Brooklyn, George Geddes, of Onondaga, the venerable Benjamin Pike, Mr. Lawton, of New Rochelle, Hon. R. S. Livingston, Mr. Bartlett, Mr. Fuller, Mr. Vail, Mr. Jacobs, Dr. Tuthill—eighty members in all.

The Secretary read the following translations and extracts made by Secretary Meigs, viz:

BEES.

We translate the following from Mons. Motschulsky:

To increase a swarm by uniting two.

Two swarms may be united by means of asphyxia, and killing the queen of the one of them. While under asphyxia the two are covered by one hive. Then, towards next morning, the greater part of the bees will renew their activity, and both swarms will commence working together. Care is necessary in the use of these asphyxia, or all will be killed.

To change the Queen.

Sometimes a queen becomes too old, and is besides disqualified otherwise—these faults are discovered in about eighteen days, when the bees begin to make their capital cells, near the external borders of the hive. To remedy this, take away the hive with its bad queen, and then smoke it with the Lycoperdon until the queen falls down, then kill her, and after well airing the hive put it in its proper place, placing the asphyxiated bees below. After this introduce a small swarm which has a queen—next day they are all busy. Great caution is necessary in using this method, for there is danger of destroying the swarm.

M. Avenarius says, that even when all possible precaution is used, the queen may be either injured or killed, and then the whole swarm will indubitably perish.

M. Datzensko, remarks that the odor of hemp is insupportable by bees—that a few hemp seeds put into a hive, every bee will quit it, and although you disinfect and purify the hive, they will never occupy it again.

Experience has proved that the most suitable time to take the honey comb from a hive, is full day, from 10 o'clock A. M. to 4 o'clock P. M., while the greater part of the bees are abroad—not in evenings or cloudy rainy weather.

Mr. Langstrath, of Philadelphia, has observed that swarms of bees are more easily gathered in mid-day than in the evening. The ancient prejudice, that bees cannot prosper in a hive in which light is admitted, is condemned by the following fact: In the Crystal palace, of New-York, we saw hives of glass exposed on all sides to the light, except where the wax adhered to the glass. And here was a great advantage, for we could see whether any damage was occurring in the hives, and to remedy it in time.

A CORN ENEMY.

The insect Sitophilus Zea Maize (Corn lover.)

At the exhibition in the Crystal palace, of New-York, in 1853, were many specimens of Indian corn, from Cayenne, all the grains of which were infested by insects, especially this Sitophilus and the *Araecerus Coffeae*—this latter one flew among us as we approached the corn. During the five summer months these destructive insects were perfectly developed under the glass of the Crystal palace, and finished by devouring the corn with which they were imported. On the return of cool weather in December, the Araecerus began to perish, while the Sitophilus kept on his ravages. It is however remarkable, that they did not attack any other corn than that which they came with from Cayenne! The ears of native corn of the United States, in the same place, were not attacked by them, nor the rice. I carried some of these Sitophili to St. Petersburg—so that it proved that with corn they can be transported from one country to another. Great care ought to be taken in examining the bags on their arrival.

Mr. Motschulsky speaks of the Isthmus of Panama, where he eagerly pursued his search after insects:

"The banks of the Caribbean gulf are formed from swampy (marécages) grounds, reposing on the gigantic corals; the debris of which we see cast up on the shore by the sea; and the same is remarked on the Pacific shores of Panama. It is to be supposed that the Isthmus was lifted up by a sub-marine movement. The mountains of it are composed, on their surfaces, of a very fertile reddish clay. The streams running from them to the ocean, on both sides of them, are slow. There is very little difference between the levels of the Atlantic and Pacific oceans, and we hope soon to see this Isthmus traversed by a canal capable of passing ships from sea to sea. The whole length of the canal will not exceed sixty versts."

I was forced to stay two days at Aspinwall, a place reported to be very unhealthy. A beating rain lasted all day, while burning vapors filled the atmosphere, until a cold fresh gale came in from the sea to give us chills. In spite of all this I searched for insects under the bark of cocoa-nut trees.

I ought to mention that some of the people of the Isthmus pretend that a nut they call cedron, which grows there, cures the bite of the viper of the country. In spite of the so-called inevitable dangers of travel there, and contrary to the example of being armed with all sorts of pistols, poignards and enormous spurs to secure swift flight on horse back, I armed myself with an umbrella and ragged clothing, and I never met with a man or an animal to prevent my movements and peregrinations. I thank God for preserving me from the pernicious influences of the climate which produces so many diseases. I had, however, nothing to complain of but lassitude and loss of strength, which are the smallest inconveniencies of inter-tropical regions.

LINNÆUS AND FABRICIUS.

"Having occasion to examine the entomological collections of Linnæus and of Banks, in London, and those of Fabricius and Kiel, and those of Lund and Sehestedt, now incorporated in the Royal museum, in Copenhagen, I believe it will be agreeable

to all entomologists to know the present condition of them, especially as to the species types, before time or accident shall destroy them entirely.

The collection of Linnæus, after his death, was sold to a Mr. Smith, who carried them to London and his heirs sold it to the Linnæan Society. Smith had put into it many species entirely unknow to Linnæus, but had the goodness to preserve, scrupulously, the tickets in the hand-writing of Linnæus. And these enabled me to recognize almost every type. The order of arrangement is just as Linnæus, himself, left it. That is to say, according to his tenth edition of his "*Systema naturæ*," a copy of which, in the society, contains corrections and additions for a twelfth edition, all in the hand-writing of Linnæus himself.

The Banks' collection, as well as his library, and his own house, were, after his death, annexed to the Linnæan Society. And that collection is, to day, in the same condition that Banks left it; and is much richer than that of Linnæus. Their preservation is still good enough to enable us to see the species.

The collection of Fabricius, was, after his death, incorporated in the museum of the University of Kiel, where it is completely preserved as it was in the time of that famous entomologist of Holstein. All the tickets consist of nothing more than strips of paper torn by the fingers, having the specific names written on them in large letters by the hand of Fabricius himself. As to the generic names, they are everywhere wanting.

The preservation of the insects is still such, that we can recognize the greater part of the species. Thanks to the cases of (acajou) mahogany, made in the West Indies, with the greatest care, to contain this precious collection.

The collection of Lund, who was inspector of the custom-houses of Denmark, and whose name is so often cited in the extensive works of Fabricius, was afterwards purchased by Sehestedt, another name which figures not less frequently in the "*Systema Eleutheratorum*." Sehestedt was rich and powerful, and was able to make and did make one of the most excellent collections; which, after his death, passed into the Royal Museum of Copenhagen, where it now is. It appears that Fabricius studied this collection for his

own works. It is in better preservation than that of Kiel. But the original arrangement is no longer recognizable, because they begin to intercalate (put in) among the species of Fabricius, an immense modern collection.

In order to complete my work, I have availed myself, as much as was necessary, of the remarks published by Messrs. Hope and Schaum, on the species of Linnæus and Fabricius, and the synonyms of Illiger with those of Fabricius, and also of Schöuheu and of Schiôdte on the Coleoptera of Denmark, &c.

To facilitate the researches after species, I followed the order adopted by Lacordaire, in his important work in the Sequel of Buffon, with some modifications, &c.

Mr. Meigs — These entomological researches are exceedingly interesting, and have engaged the studies of enlightened men in all ages. Solomon's essays on the subject are unhappily lost. Aristotle did the subject full honor. A renewed and high civilization renews the studies of many of the best and most scientific men. Farmers' clubs must encourage every effort in this vast field of knowledge, for all know how terrible insect power often is to destroy all our vegetation, and to learn the preventives and remedies, so as to surely apply them, will save us more than thousands of millions of dollars can pay for.

[Bulletin Mensuel de la Societe Impériale Zoologique d'Acclimatation, Paris, Nov., 1857.]

THE OSTRICH.

By M. Hardy.

Hamma, near Algiers, 19*th August*, 1857.

Mr. President: I have succeeded in hatching ostriches. After sitting about sixty days on the nest, an ostrich produced a young one, (no chicken either,) which, as soon as it was out of the egg, commenced running around the nest, picking grass and eating it with good appetite; the little one is vigorous, and promises to do well in future. I hoped that the other eggs would be hatched, but the old birds were very uneasy about this first born, and often quitted the nest to walk about with it and protect it. In four days more they left the nest and eggs entirely. The male and female sat on the nest alternately, the male by night and the female

during the day. We can raise the ostrich, by taking some precautions taught by experience.

Silk from worms fed on the leaves of the castor-oil plant, is considered likely to succeed.

FISH PONDS.

If in a pond of some five acres, suited to Carp, you desire to obtain a great number of young fry, say to the number of fifteen thousand, one male and one female, if there be no accidents, will fill it amply. The young Carp cannot live in it beyond two to three years, but at the end of that time they are superb; must be taken out and a new stock put in. The fish are well elongated, and of a beautiful yellowish, golden, brown color.

GUM TRAGACANTH.

By M. Sace, of the Society.

This gum has the peculiar property of swelling in water without dissolving, and forms one of the strongest adhesive matters which we have. And as in drying it remains somewhat supple, transparent and elastic, it is very useful for many purposes; so that within the last three years the amount of it used has nearly doubled. Europe now uses about seventy-five thousand pounds weight of it annually. This gum is the product of several species of astragales, such as Milk vetches and Crow-toes, which grow on the little hills of dry, calcareous soils in the Grecian archipelago, and in Asia Minor, particularly in the vicinity of Angora, of Caissar, of Yalavatz and of Bourdur. It appears that the species which furnishes the best gum, are the Astragalus verus and the Creticus. The gum oozes through the bark in the heat of summer; it compresses all the thick sap under it. For a long time we were contented to collect the gum where it was formed, and it bore a very high price. Now we skin the bushes, and with a keen knife make incisions lengthwise, through which the gum oozes, which soon dries, and is removed in three or four days. If it happens to rain at this time, or high wind throws dust on it, it loses its first quality and becomes second. All the bushes are not, therefore, cut at one time, so as to injure the whole crop. These astragals will probably succeed in Algeria.

PRINCIPAL WRITERS ON ENTOMOLOGY.

By Henry Meigs.

Solomon, (work lost,) Aristotle, Hippocrates, Aelian, Democritus, Neoptolemus, Philistus, Nicander, Herodius, Aristamachus, of Soli, wrote his fifty years' experience on insects, Pliny. After the fall of the Roman empire, no more entomologists appeared for several ages. Then came Titus, Aetius, Alexander, Ovibasius, Trallian, Paulus Aegineta, (between the fourth and seventh centuries.) Between the ninth and twelfth centuries, we have the Arabian writers Rhazes, Avicenna, Avenzoar and Averrhoes; then, to the fifteenth century, a few writers, of little note, such as Myrepsus, Platerus, &c.; Albertus Magnus, of 1280; Agricola, in 1549, on subterraneous animals, (see Agassiz on that,) Wotton, of England, folio, in 1552; Rondeletius, of Montpellier, in 1555. on water insects.

A folio, in 1559, Naples; Aldrovandus, in 1602, voluminous work on insects, an indefatigable inquirer, terrestrial and aquatic insects. Donovan gives him much credit. Wolfgang Freuzius, 1612, on insects of air, earth and water. Wilde, on ants, Rome, 1616. First work published in Britain on insects, 1622, quarto, at Edinburgh. After many others, appeared a folio by Claude Perrault, of the French Academy. After many more, appeared in 1685, Swammerdam. In 1687, the celebrated Leeuwenhoek, with microscopic observations. After many more, a folio, by Sir Hans Sloane, in 1707 and 1725. In 1731, a folio, by Catesby. In 1735, Linnæus. In 1762, a systematic, valuable work, in Paris, by Geoffroy. In 1763, a folio, by Gronovius. After many more, in 1775, Fabricius, a pupil of Linnæus. After many more, in 1792, Donovan's Natural History of British Insects. In 1793, a great work on insects by Latreille, of Paris. In 1796, a valuable quarto, by Jacob Hübner, Augsburgh. In 1800, the celebrated Cuvier gave his great work, "Comparative Anatomy," treating at large the organization of insects. Donovan, also, quarto, on the insects of India. 1802, Kirby's excellent work appeared. In the same year, Thomas Marsham, the oldest of British entomologists, published his valuable work.

Drury, of London, expended forty thousand pounds sterling in researches of this sort, and published an admirable quarto, with plates, 1782. His collection of insects was eleven thousand. For a single insect of his collection, the *Scarabæus Goliathus*, Donovan gave twelve guineas and a half.

So far, our entomology contains over seven hundred orders, each having many species. They are legion.

Prof. Harris, of Harvard College, Massachusetts, and Asa Fitch, of Albany, N. Y., have done us much good in this science.

We are permitted to hope that, as in other science, it has required ages to establish a few modern truths, such as steam, electricity, &c., so ages of study of insects may lead us to the knowledge of means to control them, too. As they cannot alter their seasons and habits, we may learn to avoid their destructive power, or to destroy them.

RIPE *vs.* UNRIPE GRASS.

Solon Robinson read the following letter, from an experienced farmer in Kentucky:

Washington, Ky., Jan. 11, 1858.

Dear Sir: I observe in the proceedings of the Farmers' Club, of December 4, a statement, by Dr. Wellington, that grasses cut for cows are suffered to become too ripe before harvesting. Some grasses may, to most advantage, be cut in the flower state, and some after the seed has ripened. I take the liberty to refer you to some tables in my agricultural essay, pages 233 and 234, given on the authority of Sir H. Davey, from which you will discover there is a very great difference in different grasses in this respect. Timothy, you will perceive, is very much more nutritious when ripe than when cut in the blossom state. Poa angustipolia has double the nutriment when cut in the flower state, (see second table.) In other grasses the nutriment is nearly the same in the seed and flower state. You will perceive, from table second, that the nutriment of different grasses per acre varies from 279 lbs. to 1,430 lbs. per acre. The latter is the Poa angustifolia, which is also very productive in hay, though it is exceeded by the Poa fertilis in hay, but not in nutritive matter. In this latter respect it falls short considerably. Both these grasses yield most hay

when harvested in flower, but the latter yields most nutriment when the seed is ripe. Your Club would render an important service to agriculture, if they would take the trouble to introduce these two grasses into our country. I would be greatly obliged to you, if you could procure a small parcel of each, and forward to me, by one of the Maysville merchants, or by express, in time to seed, in March or April, by way of experiment. Be so good as to read this to your Club, and oblige your friend,

A. BEATTY.

I add a full description of the two desired grasses, and also Trifolium machororhizum (table 3, page 236):

	Hay per acre.	Nutritive matter.
1. *Poa angustifolia.*—Narrow head meadow grass, native of Britain, product at the time of flower,	7,810	1,430
Ditto at the time of seeding,	3,811	701
2. *Poa fertilis.*—Fertile meadow grass, native of Germany, product at the time of flowering,	6,653	733
Ditto at the time of seeding,	8,235	1,109
3. *Tripolium machororhizum.*—Long rooted clover, native of Hungary, product at the time of seeding,	44,654	4,211

The above are from experiments made by Mr. Sinclair, in the Duke of Bedford's garden, at Woburn Abbey.

Now, Mr. President, as this is one of the most important questions that can be discussed by farmers, as to what is the proper time to cut grass, I hope it may elicit some remarks from one of the best farmers of this State, who happens to be present to-day, from Onondaga county. That is, he is a gentleman of experience and careful observation, and his experience will be valuable to others present. I allude, Sir, to the Hon. George Geddes, a name well and favorably known to New-York farmers.

Mr Geddes—I somewhat object to being called upon to give my views so unexpectedly. The question has many difficulties, because we don't understand terms. One man calls his grass ripe when he cuts it, which another man would call green. I want one-third or one-half of my clover heads brown, so that

about the seed would grow. I cannot cure my clover to suit me if I cut it when it is more unripe than that. The kind I grow is the medium size, that always yields two crops, the last for seed. Timothy we cut when part of the seed will grow. That is, when it is just as ripe as I would have wheat when cut. Timothy is the universal grass where I live, in Onondaga county. Some farmers cut grass in the blossom state, but the mass of people are satisfied that the ripened grass makes the most nutritious hay; and it is much less labor to save it in a sweet condition.

Cutting Clover.

Mr. Pell—I cut my clover when the heads are two-thirds ripe, and take it in and salt it the same day. Timothy, I cut when the blossoms have fallen off, and treat it in the same way as clover. Wheat, I cut when in the early dough state, and it is left to ripen on the ground. Some wheat green, weighed sixty-five pounds per bushel, and contained eighteen pounds of gluten, while wheat cut ripe from the same field, weighed only fifty-six pounds per bushel, and eight pounds of gluten. The average of gluten in this country is not over five and one-half or six pounds per bushel. I have grown oats cut in the milk, that weighed forty eight pounds per bushel, while the same crop cut in a ripened state, weighed only thirty pounds.

Dr. Waterbury—The great tendency of community has been to defer cutting all grain too late. When this error was fully made known, some young farmers ran to the opposite extreme, and cut grain and grass too green. I spoiled my first crop of corn by cutting it up too soon. It would not ripen. It is well known that clover seed is one of the most nutritious articles of stock feed.

Mr. Pell—The roots of corn are so fine that all the roots of a large hill of corn could be carried in a man's hat. The roots spread through all the soil to gather nutriment, hence it should be finely pulverized. If a crop is cut green, it takes away but very little matter from the soil that goes to produce seed and exhaust the land. It is the ripening of seed that reduces the productiveness of land.

I once fatted some hogs entirely with apples, that looked well, but in boiling the pork it wasted near two-thirds of its weight. Hence it is not only important, but imperative, that fattening animals should be fed cereals.

WHEAT AND CORN CROPS.

Mr. Geddes inquired of the President whether the wheat he mentioned, cut green, and of the greatest weight per bushel, gave the greatest yield of bushels, in profits, per acre. The latter is important, since a buyer never troubles himself about quality or quantity of gluten, so that the grain looks well.

Mr. Pell—The field I grew the wheat mentioned upon, was manured with charcoal dust, and in one place, where the cart upset, it was highly impregnated with this substance, and that portion yielded at the rate of seventy-eight bushels of wheat to the acre. I think that would have been the most profitable.

T. W. Field—I find in all experiments so many attending circumstances, that I can get at no certain facts with a single experiment. One season the sun shines, and another it rains. You recollect the wheat I exhibited here, grown upon loose sand, that was better than wheat upon adjoining soil manured with guano. I once applied burned bones, at the rate of eight tons per acre, without a sign of benefit to the crop. What made that sand heap productive?

Mr. Geddes—So we get crops from gravel thrown out of cellars. As to growing one hundred bushels of corn to the acre, as one gentleman mentions, I have never seen such a crop grown. I should like to.

Mr. Pell—I have grown a hundred bushels of shelled corn per acre; but it cost me nearly as much as the crop was worth in extra manure and labor.

Mr. Geddes—A good deal depends on what we call a bushel of corn. I believe that corn will shrink from December to May fifteen per cent. I think I get a good crop when I raise sixty bushels of corn per acre. Corn premiums are often awarded to a very rough manner of measurement. I never count my crops until I sell them, and whatever they measure then, I make my estimate per acre yield upon.

Mr. T. W. Field — The corn crops that measure over one hundred bushels per acre, often cost in manure and labor more than their value.

Prof. Mapes—The yield of corn in my neighborhood is about sixty bushels per acre. I have raised one hundred and ten bushels per acre, with the same treatment given to other parts of the farm—that is, under-draining and sub soil plowing, and special manuring. I have no doubt that one hundred and twenty-five bushels of corn have been raised per acre, and perhaps the much larger crops published. I don't think you can find poorer soil, or better soil, than is to be found in the State of New Jersey. It will not all grow such crops. Where we get sixty bushels of corn upon an average, we cannot get one hundred bushels of potatoes, and rarely over two tons of hay per acre. From some New Jersey soils, that to some would appear worthless, the owners get two hundred and fifty bushels of potatoes, by the use of green sand marl.

T. W. Field—Near New-York city we cannot grow apples to any profit. So it is with every crop; it must be adapted to soil and climate. Within a radius of fifty miles around New-York, the pear grows to perfection, with the exception of a few kinds. The pear tree here has a great longevity. The peach is ephemeral. Apple trees endure in a scraggy form, but unproductive. Cherries and plums are short lived. While pears are found everywhere about here of great size and age.

Solon Robinson—Yes, one in this city, still in bearing condition, is two hundred and twenty years old.

Prof. Mapes—One of the most productive fields in Maryland, celebrated for its great crops for many years, is one where an immense number of coal-pits had been burnt. I get all the railroad cinders at Newark, and find immense benefit from their use, applied directly to the soil, or upon manure heaps in the stable and pig pen. I use this charcoal dust as a divisor of superphosphate and wood ashes. It is not a manure, but it is a chemist, constantly at work in the earth, where it is placed for our benefit.

It is a great absorber of noxious gases, that render stables and sinks unhealthy. It is a most important aid to the farmer.

Solon Robinson—One of the most important questions of the day has lately been called to my attention, in conversation with a gentleman, who speaks from the book—the cash-book—who states to me, that he is confident that he can raise more pounds of merino wool, such as sold the last season at fifty cents a pound, and more pounds of mutton per acre of that breed, than of the long-wooled variety. Now, as I know that the statement from the gentleman himself will be interesting to the Club, I again call upon Mr. Geddes.

Mr. Geddes—Such wool as I produce is not the very finest, but the real merino sheep, that produce four to five pounds per head, such as I sold at fifty cents of the last clip. The result of my experience is, that I can produce more pounds per acre than with the Cotswold variety. A small sheep lives upon less forage than large ones. The rule is about two and a half per cent. of the weight of sheep per day of hay. In summer the land will carry more weight of small sheep on an acre than of coarse wool sorts. Such a sheep as I like, grows the wool so compact, that it cannot be grasped on the back so as to hold the sheep. I can pick such a sheep as I most esteem, in the dark, by the feeling. The wool feels almost as firm on the back, as a board. This class of sheep live better through a drouth than the larger variety; and I have no doubt through a series of years can produce more pounds of mutton per acre of this breed—that is, the Vermont merinos—than I could with Cotswold sheep. I calculate that my sheep weigh one hundred pounds each, when they go into winter quarters; and that they shall go to pasture in the spring of greater weight than they came from it in the fall. I suppose, as Mr. Robinson says, that these sheep would dress fifty pounds each. Such sheep as mine are usually estimated at the rate of three per acre. That is, a farm of one hundred acres, that grows perhaps ten acres of corn and family vegetables, with pasture and mowing proportioned to the stock, will carry one hundred head of sheep, with the family cow and necessary team.

The subjects for the next meeting were—" The potato," and the " red cattle or New England."

The Club then adjourned.

R. L. WATERBURY, *Secretary pro tem.*

February 2, 1858.

Present—Messrs. President Pell, Hon. John G. Bergen, of Gowanus, Dr. Waterbury, Dr. Smith, Prof. John Adams Nash, of the American Farmers' Magazine, Alanson Nash, Mr. Pardee, Solon Robinson, Prof. James J. Mapes, Mr. Gore, of Jersey, Thomas W. Field, of Brooklyn, Mr. Sperry, Mr. Vail, Asher L. Smith, of Lebanon, Connecticut, Mr. Lowe, Wm. Lawton, of New Rochelle, Dr. Underhill, of Croton vineyard, and others—fifty members in all.

President Pell in the chair. Henry Meigs, Secretary.

The Secretary read the following translation made by him:

[Revue Horticole, Paris.]

We translate some extracts, viz:

FAIR OF DIJON.

Where can grapes be found if not at the Burgundy exhibitions? We hasten to say that the collection of grapes exhibited at Dijon was truly worthy of Burgundy. One must live in this favored land to obtain an idea of the immense collections of grapes formed within it.

Mr. Malnoury, exhibited seven hundred varieties of grapes, either for wine or table, all classed and ticketed in perfect order. And alongside of Mr. Malnoury's exhibition, were the beautiful grapes of Messrs. Ocquidant, Letaluet, Nathey and others. Enormous pears were there. Gold medals were awarded to these exhibitors. They would have shown gloriously at the best exhibitions of Paris.

Buds gathered January 22d, to 30th.

Mr. Meigs—For examination, as to the effect of the remarkably high temperature of the three first winter months, in their development.

I believe that those plants and trees which are indigenous with us, and have of course gone through all the changes of temperature for probably about 4,000 years, have so adapted their habits as not to become developed prematurely, by even these warm winter months, but wait until due spring time. While other trees and plants, which have been brought here, and generally from Southern Europe, since Columbus, are more apt to become developed, and be afterwards killed by frost.

From Messrs. Parsons, from their nurseries at Flushing, Long Island, January 29th, 1858:

White oak, Norway maple, sugar maple, white birch, white ox-heart cherry, Damascus rose, Baron Cuvier, canoe birch, black walnut, black birch, Cerasus Virginiana, (wild cherry,) yellow birch.

From Dr. Stark, of Bedford, Long Island:

Ox-heart cherry, natural peach.

From Mr. Oddie's garden, Bedford:

Lawton blackberry, weeping willow, raspberry.

From Henry Meigs, Jr., corner of 7th avenue and 13th street:

Wistaria, trumpet creeper, tree cranberry, of Lake Winnipissiogee, prairie rose, Isabella grape.

The regular subjects of the day were then called up:

THE POTATO.

Solanum Tuborosum, or Fibeous rooted Nightshade

Mr. Pell remarked, the varieties of potatoes that can be produced from a single seed ball, may truly be said to be almost innumerable. All differing in the shape and color of the leaves, time of ripening, color of the interior of the skin, the taste, farinaceous, watery, and glutinous principally, soil required, and time to plant. No vegetable production has proved itself so essentially important to the world as this native of South America, which two hundred years ago was neglected, little used, and really considered unfit food for human beings. Since then it has been multiplied, and improved, so as to form the chief subsistence for many millions of people, and is destined to maintain its influence on all successive generations of men, from the incontrovertible fact, that

chemical investigation has shown it to possess a peculiarity distinguishing it from nearly all other vegetables and grains used as human food. Although affording an inferior nutriment in proportion to the bulk necessarily consumed, from its consisting of three-quarters water, it notwithstanding, contains in its composition all those elements of nutrition, that are known to exist separately in most other grain and vegetables, and can, therefore, only be obtained from other articles of food by combining different kinds together. Consequently, the potato may be used singly for nutrition and support; while a combination of other vegetable products are required to furnish the varied elements that are indispensable for the growth and support of the human frame. In ignorance of this fact, both rich and poor, during famine abroad, alike committed error in attempting to substitute, some one article or other for food, as an equivalent in itself for the potato. The poor tried to maintain themselves on grain; the rich substituted rice, on account of the popular but erroneous idea, that it furnished the sole article of food of the people of China, and other countries. Rice alone, however, is not anywhere on the globe the sole support of any portion of the human family. Experience having taught those who used it as a chief article of diet, that of itself, it is not capable of supporting life; and hence, there is always consumed with it by those people—oil, or some seed, grain, vegetable, fish, or meat, in order to add to the rice the elements of nutrition it does not itself contain. Thus, even if a full supply of grain food could have been obtained, the mass of the people would have consumed it, ignorant of the necessity of those combinations that are requisite in its use, and disease, to a considerable extent would have resulted necessarily, until experience had corrected the error. A general mistake intimately connected with the use of rice was the belief that the bulk acquired by boiling indicated a like quantity of nourishment contained in such bulk; and that it was far more nutritious than Indian corn, because it furnished by an equal quantity, a far larger bulk of apparently solid food. Rice contains, by analysis, eighty-five parts in one hundred of starch; a given quantity of it will, by boiling, absorb a large proportion of water, and swell into a huge and

apparently firm mass, containing a small proportionate quantity of nourishing matter. One pound of it may be made to form, with water, a starchy mass weighing six pounds. It differs from all other kinds of grain by containing so large a portion of starch as we have named, and gluten insufficient for the sustenance of the body, when no other food is used, unless eaten in inordinate quantities, it possesses a few nitrogenous constituents, and a small percentage of casein, or some analogous substance.

Whereas, the potato, in addition to much water, consists of gum, woody fibre, albumen and starch, in variable proportions, according to variety, and the dry solid matter depends upon the state of ripeness to which it has attained ; those perfectly ripe have 33 per cent of dry matter, and the unripe 23 per cent; starch varies with variety from 10 to 28 per cent, and those keep the best, and are less liable to rot, that contain the most starch; and at the same time in keeping until spring, they lose a considerable quantity of it, say from three to six per cent of their weight, which diminution is caused by the conversion of the starch into gum and sugar.

When potatoes are frozen, and thawed sufficiently to render them unfit for food, they are still capable of making good starch, as it undergoes no diminution. They also lose gluten by being kept long after they are dug ; new potatoes contain usually about three per cent, and old ones one and a half per cent; this diminution of the proportion of gluten and starch, accounts for the small value in stock feeding, agriculturists have experienced old potatoes to possess.

Potatoes thrive far better upon a light loamy soil, neither too moist or too dry, than upon any other, and newly broken up pasture land without manure, always yields the best flavored. When the soil is thoroughly drained, and subsoil plowed, they delight in much rain, and no farmer on contiguous land, treated in a different manner, by the aid of manure and skill, can raise crops of equal weight and quality. Warm climates, dry soils, and dry seasons, largely increase the percentage of starch, which is sometimes defective in rainy districts.

Potatoes are without doubt an exhausting crop, but by proper manuring, plowing and cultivation, the same field will yield remunerating crops of corn and potatoes alternately, for very many years, and great crops, if a mixture of soda, with the sulphate of magnesia, or the sulphate of soda is used, a supply of inorganic and organic substances always produce a corresponding healthy growth and early maturity, and likewise add to the proportion of nutriment, which is remarkable as containing within itself all the varied elements necessary for forming healthy blood; not a single substitute for it, with perhaps the exception of oatmeal, possesses this remarkable property; and hence, the use of several articles of food is necessary, in order to secure a sufficient supply of the numerous elements of nutrition contained in the potato. To accomplish this end with other food, you would be compelled to use carrots, cabbage and turnips together, or spinach, asparagus and cucumbers, or beans, peas, and rice, or Indian meal and oatmeal. Starch flour made from rotten potatoes has been erroneously considered as equivalent to the potato; this so called potato flour is not flour in the proper sense of the word, as applied to wheat flour, for it does not contain the elements of the potato, but consists wholly of fecula, and is unfitted to support health or even life for any considerable length of time; you might as well consider this starch equivalent to the potato, as to consider whether starch is equivalent to wheat or flour. Onions are very rich in nutritive qualities, so much so that one ounce and a half may be considered as equivalent to one ounce of Indian meal; therefore, if onions are mixed with potato starch, and used as food they will furnish some of the elements of nutrition essential for forming healthy blood. If you would possess that inestimable blessing health, always use parsnips, carrots, turnips and cabbage, along with meal of some sort, either with bean, pea, or corn. As neither of them alone contain a sufficient variety of nutritive elements to support the human body in health. Next to potatoes, oatmeal has more superior nutritious qualities, than any other cereal as human food; and if the inhabitants of Ireland could be induced to turn from the potato, which has become an uncertain crop there, to grain, as their food, it would produce an

improvement in their habits, and render them less liable to suffer from periodic famines. And they will eventually come to this, if its price continues to bear such a relation to the cost of potatoes as to render its consumption more economical than that of the potato.

The nutritive products in one thousand parts of the potato, compared with the turnip, carrot and parsnip, is as follows:

	Soluble or nutritive matter.	Mucilage or starch.	Saccharine matter.	Gluten.
Potato, ...	240	160	17	32
Turnip, ...	45	7	34	2
Carrot, ...	98	3	95	1
Parsnip, ...	99	9	90	1

The table speaks for itself, and shows that there is no vegetable product, not even excepting grain, or the most useful of the palm family, which has proved of such immense importance to people of the temperate regions, as this admirable tuber. Notwithstanding it is a tender plant, we find it growing luxuriantly in nearly every part of the world, from Norway to the equator; and although it is generally planted early in the spring, yet by selecting an early ripening variety, you may plant it successfully even in July.

Seed potatoes occasionally fail, and so do the seeds of all other plants at times, and the necessity of a change of seed is recognized in almost every agricultural district; potatoes growing on low lands, are preferred by those planting on high lands, and vice versa.

I have made experiments with regard to the change of seed, which will lead to the most valuable practical results, and teach us how we may at all times secure fruitful seeds, without in a single instance being compelled to import our supplies from a greater distance than the confines of our own farms. When perfectly satisfied in regard to these important matters, I will communicate the process, and in this connection may state, that for the past eighteen years, I have not found it necessary to renew, except on my farm, any variety of garden seeds or cereals, and so far from degenerating, they are far finer now than they were at the commencement. I have sown the same rye, wheat, oats and corn, for that period of time, successfully.

I find by experiment that a wonderful change can be effected in seed potatoes, and other seeds, by a top dressing, which will increase the starch, and decrease the saline matter and albumen, thus causing it to be very fruitful, and plainly indicating the control man has over nature.

I can change the character of any seed, when it begins to show premonitory symptoms of deterioration, without going off of my farm. This is a chemico-physiological subject of intense interest, and one that I do not intend to leave until most thoroughly investigated.

New varieties of potatoes are readily procured, as their prolificacy, color, shape and quality, have been prodigiously diversified. In selecting, therefore, for cultivation, it would be well to pay more attention to its properties, than its local name. Notwithstanding the varieties now cultivated are very far superior to those from which they originated, they are still susceptible of a wonderful degree of improvement.

The potatoes before you I raised from seed, which plan is seldom adopted, from the fact that it requires successive years of cultivation and care before they attain full size. I selected a seed ball from the earliest and finest potato grown on my farm, in 1849, which were separated from the pulp, dried and stored until the ensuing spring, when they were sown in a moderately heated hot-bed. At the expiration of a few days the strongest plant was selected and planted, and the others all destroyed. The produce in the fall was six potatoes the size of a white walnut, and one as large as a Magnum-bonum plum. The top end of this only was planted in the spring of 1850, and yielded ten potatoes, five small, four larger, and one an inch and three-quarters in diameter. All ripened one week earlier than the mother potatoes, planted in another field, but one-half of each potato was watery and the other half moderately dry. In 1851, the top end of the large potato was again planted, and produced ten nearly equal in size, with one exception, which was retained and the top planted in 1852. They were three-quarters mealy and the balance watery, and ten days earlier than the mother potato. In 1853 they were much larger, all mealy, and two weeks earlier

than the mother potato, which was earlier, by two weeks, than the Egyptian kidney, Sovereign, early frame, Mercer, or early June.

Thus I continued year after year until I produced the potato in question, which, at the present time, is not surpassed for early properties, and fine eating qualities, by any solanum now grown in the United States or Europe. They will keep a year; and I have never known one of them to rot.

Furthermore, the sprouts that put out in the spring, before planting, if taken off carefully with the little spungioles and rootlets attached, and planted precisely as the potatoes are planted, will yield as abundantly as the potato sets themselves. And if I was compelled to select between the two, I would choose the sprouts.

The top ends of all potatoes are more watery than the other end, consequently they are not so fully ripened, and are, therefore better calculated for seed. The shoot from the top end is invariably more vigorous than any other shoot on the potato.

My potato ground is always plowed in the fall, and top-dressed with muck and oyster shell lime. In the spring it is sub-soil plowed to the depth of twenty inches; in May, drills are opened, three and a half feet apart, and filled with barn-yard manure; upon this the sets are planted, ten inches from each other, and the drills reversed, which covers the seed. After two weeks have elapsed, the whole field is harrowed across the drills, which relieves the sets from a superabundance of earth, levels the field, and destroys the weeds. When the plants are three inches high, horse hoes are passed between the rows, followed by hand hoes, that cut all weeds not destroyed. No attention is then paid to them until a fortnight elapses, when one horse plows are put in, to plough from the potato plants; this permits air and water to find its way readily to the roots. In ten days thereafter the drills are restored to their original form, and so left until the crop is gathered. That interesting period is indicated by the decay of the tops and ease with which the skin of the tubers can be removed. They should then be raised, in dry weather, and housed.

Mr. Knight proposed that the blossoms should be cut off, and though he has been much ridiculed for the suggestion, I highly approve of the plan, for the following reasons: All plants that ripen their seed exhaust the soil; all tuberous growing plants that ripen their seed, do so at the expense of the tuber. Therefore, if you would have inferior potatoes, you can accomplish the object by permitting the seed balls to perfect; and if you desire seed balls alone, withdraw the potatoes carefully, and you will succeed.

Many farmers approve of planting whole potatoes, and this mode has gained ground in the United States, much to my surprise; but I do not think any man who gives this matter a moment's consideration, will continue the practice. Every large potatoe contains from ten to twelve buds, or eyes, from each one of which a stem will arise; consequently, you compel land to support ten or twelve plants, that is capable of growing but one. You might as well cause ten or twelve cows to live upon one cow's grass. It would be far more economical to gouge out the eyes, and plant them separately, ten inches apart, in a drill; by which mode a far greater amount of produce will be obtained. When whole potatoes are planted, many weak and late shoots grow, affecting the quality, productiveness and size of the entire hill.

The yield of the potato is various; but under my system of culture four hundred and thirty-two bushels have been grown upon an acre of land. The most important application of this admirable tuber is as food for man, being invariably found on the tables of all classes. It is likewise used extensively as food for stock, and, in France and the Netherlands, distilled into ardent spirits. In Germany made into bread, and in Ireland into wine.

Mr. Pell presented several sorts of potatoes, collected in Peru, by Mr. Eugene Koehn, the importer of the herd of lamas, lately mentioned in the papers. He read a paper on the history of the potato, and its uses as food, contending that the potato is the only sole article that can be used for food, and that all other vegetables require a mixture of some other substance to support man in a healthy condition. The potato contains gum, starch and woody fibre, all requisite in food. Their value varies in the same variety

in different years, and when grown upon different soils. Although the potatoes containing the greatest quantity of starch are the most valuable, the extracted starch is not a good substitute for the whole tuber. Manure should be used calculated to increase the quantity of starch, and soil and varieties selected for that purpose. Mr. Pell also recommends the production of new varieties of potatoes from seed balls. He showed some handsome tubers, resembling the English whites, which he had produced. His potato ground is always plowed in the fall, and subsoiled in the spring. And in harvesting potatoes, dry weather should always be selected. Mr. Pell advocates cut potatoes, or gouging out eyes for seed.

Professor Mapes rose, evidently prepared to express his dissent from the process of "gouging." Many years ago, and especially in a subsequent year of scarcity, that had been recommended. He had tried the experiment. Two bushels of seed potatoes were taken. One of these bushels was planted whole; the other was subjected to the gouging with a chairmaker's gouge. The result was, that both bushels being similarly and carefully planted, the same number of potatoes was obtained from each bushel, but, upon weighing, the difference was largely in favor of the crop from the uncut seed. Some person in Germany had stated, that four hundred potatoes might be produced from one, by a peculiar mode of cultivation which he advocated, and which was to be conducted until the blossom made its appearance. In practice, he (Prof. Mapes) had found that the adoption of that plan would certainly increase the number of potatoes, but their size was correspondingly small. The weight of the lot was not so great as that of produce from flat culture, growing in the same soil. There were more pounds with one-tenth the number of tubers, in the other case, a great number of very small potatoes, and as useless as they were diminutive. The starch of the original potato was, doubtless, the natural pabulum of the growing plant. In planting whole potatoes, it would be found, that after three or four years the button or potato apple will re-appear, but it was also true that planted eyes would produce only half the weight that the whole potato would have yielded. Farmers are apt to

expose their cut potatoes to dry before planting. Why do they do it? If useful, it can only be because, in drying, the albuminous cut side acquires a sort of artificial skin. The same explanation will account for the supposed advantage of rolling and encasing the cut potatoes in plaster.

General Beatson had made some valuable experiments at St. Helena, on this subject. He thought it was well to keep the troops stationed there in some kind of useful and healthful employment. He obtained permission of the British government to employ them in raising produce, and, writing to the Royal Society, received directions how he might usefully experiment upon the growth of potatoes. The report with which he has furnished the world states, that "the largest potato, planted entire, cultivated flat, and at the depth of six inches," yielded the best results. The experiments of the speaker were quite confirmatory of this. He always planted potatoes six inches deep, in preference to any other depth; he planted them entire, and believed flat culture to be the best.

Dr. Waterbury thought that the science of botany, which was now beginning to be better understood and more usefully applied, would throw some light on the culture of the potato. The botanist is fast becoming something more than a mere collector of dried specimens, a kind of hay, to be packed away and labeled with uncouth names. The tuber is to be regarded as a part of the stem of the plant. Like other stems, it consists of a collection of cells; but unlike common stems, the cell membranes instead of being condensed into *lignine*, contain within them granules of starch. When the potato is planted, as it germinates, the nitrogenized matter of the cell wall acting on the starch, as in matting, and probably, also, in the spring vegetation of the maple, converts the starch into the more soluble substance, sugar, that it may be the more readily absorbed by the young plant.

The buds, or eyes, like other stem buds, are complete plants in minature, which, in the process of germination, extend their roots into the surrounding mass of the tuber. They have no connection with each other, and hence the tuber, like any other portion of stem, may be divided for the purpose of propagation by cuttings.

Small potatoes correspond to stunted portions of the stem, in which the buds are crowded, and, consequently, each bud supplied with less amount of nutriment. Large potatoes do not necessarily contain more buds than small ones, as they are merely the small ones expanded; hence they furnish to each young plant a greater supply of food than small ones, during the period in which it is dependant on the tuber.

But the whole amount of pabulum furnished by the tuber becomes so insignificant, when we compare it with that furnished by the soil, during the whole life of the plant, that it becomes exceedingly difficult to appreciate its effects on a crop. The proper period to measure these effects would be, if it were a practicable one, that at which the young plant ceases to depend on the tuber.

It is very possible, that the advantages to the buds of isolation, may more than compensate any injury and loss of substance to the tuber from the gouging or cutting process. It is a well-known fact, that the potato is not injured as much as the apple by section. Tubers that have been clipped with the hoe, in digging, are found the next spring with the surface of the wound dry, and the internal structure unaffected. It is true, too, that the plants may be more evenly distributed in planting, if cuttings are used. The question is, after all, a question of fact, that must be settled by repeated and very careful observation.

Professor Mapes asked, whether, if the starch, instead of becoming sugar, became converted into acetic acid, the integrity and success of the future growth would not thereby become vitiated?

Dr. Waterbury replied, that, undoubtedly, in such cases where such perversion from unknown and unforseen causes did take place, acetic acid would not serve as a substitute.

Professor Mapes observed, that such was frequently the result.

The Chairman, remarking upon the whole subject, observed, among other things, that he "should no more think of planting whole potatoes, than he should think of flying."

Professor Mapes would ask whether the difference in size might not result from this—was it not *hilling the stem* that produced these numerous additional small potatoes? The chairman had no doubt, been an accurate operator; but the nature of his

ground, always in careful condition, might form the exception that led to the result, he attributed solely to a particular mode of culture, in raising potatoes. That soil might be more self-sustaining in alkaline properties, and so the plants might not be so liable to the development of acetic acid.

The Chairman admitted that possibly there might be something in the suggestion.

Dr. Waterbury could easily understand, that high cultivation would give an unnatural amount of *pabulum*—a quantity plants could not obtain upon poorer soils.

Dr. Underhill strongly confirmed the views of Prof. Mapes, in the remarks he had made. After much patient attention practically to this subject, he found himself convinced it was best to plant a medium sized potato, and to plant it whole. Such a practice would insure a larger crop, and bigger as well as heavier potatoes. Unfortunately, the practice has been too general to sell the big potatoes at market, and save the less tempting potatoes for seed.

Dr. J. A. Smith said that the disease among potatoes was as common in Britain as in America. Might it not be traced to the equal prevalence in England as here of the very practice Dr. Underhill had just denounced. A potato was as much a living thing as a man or a lion; the law of reproduction and life applied equally to both. If none but the most puny, diminutive and sickly of the human race were allowed to marry, would that be a reasonable or likely way to raise a tall or vigorous race of human beings?

Hon. John G. Bergen, of Gowanus, advised that to avoid rot, if that were the sole object, potatoes should be planted without cutting them. His experience had been in favor of the cut potato. The uncut, doubtless, expended the greatest quantity of seeds. As to selling the finer and planting the smaller, most farmers in his neighborhood would reject the little ones as seed. Some years ago he had tried the uncut plan. He had a greater crop and they came up sooner. They kept ahead of others through the entire season. But it took at least ten times as much seed in the planting.

Professor Mapes contended that the large uncut seed did not send up a greater lot of shoots than in the other case. He had planted in its unmutilated state a large potato that had been sent him from California, the produce was 110 potatoes. The seed had a multitude of eyes. None of its progeny attained its dimensions.

The Chairman said he once cut a potato into sixteen eyes, and planted it in a hot bed in thumb pots. In due time it was planted out, and the result was two and a half bushels. The weight of that potato was two pounds, and it also was from California. The crop was all cut and planted—the yield was nearly three wagon-boxes full. The following year it became watery and inferior, and was discarded. Probably it was the "Western red" that had been carried to California, and there attained its large dimensions.

Dr. Underhill would like to know whether that watery character was natural to that variety, or did it result from wrong culture, or some deficiency in the soil not existing in the California soil; potatoes were generally too light—the heaviest were the best.

Professor Mapes alluded to the experiments of Mr. Robinson. His peculiarity of culture was to leave a portion of the crop in the ground all the winter. By this process, if advantageous as was asserted, the skin became tougher and the starch better perfected. He had tried it. The first year it answered. The next, the frost interfered. On soils that are not easily frozen it might answer.

The regular subject of the day coming up, the Secretary, the Hon. Henry Meigs, stated that Mr. Alanson Nash, one of the earliest members of the Farmers' Club, and who has on all suitable occasions manifested his appreciation of it by sustaining it, has, by particular request, undertaken with much industrious research among the scattered fragments of knowledge, to give us a history of the now well marked and acclimated and well taught red cattle of New England, and has produced in his essay on that subject all that may be useful or desirable in relation to this first and nobly created American stock of cattle. He has done for this

very useful purpose what our Washington Irving did long ago in his analectic magazine for literature, according to his own motto, "Sparsas Colligere Flores." Tuscany has for centuries been celebrated for her spotless white cattle, looking like snow on her green meadows; but our American red is worth more than that race for beef and work, two to one.

Mr. A. Nash read the following paper on

THE RED CATTLE OF NEW ENGLAND.

The red cattle of New England came over with the emigrants from England and Wales, and other countries in Europe.

The first emigrants or settlers in New England came in colonies from the different regions or counties in England—each emigration generally brought over with them their first stock of neat cattle. If a Pilgrim or emigrant had a good cow for milk, butter or cheese, he brought along the favorite animal as a *household god;* and when the governor of the clan started with the embarkation, he had the best bull of the shire selected to perpetuate the stock in the new world. Thus a superior stock of cattle, embracing the best from all parts of the mother country, and containing all the known different races, were landed in the New England settlements when they first located. From all these fountains has arisen a new and peculiar stock of cattle in New England, unlike any other ever known in the old world. The herds of New England show strains from the very best stocks from England, Scotland, Ireland and Wales, as well as from Holland and the northern and western departments of France, and some other countries on the continent of Europe.

VARIETIES OF CATTLE IN ENGLAND.

In England, from the earliest times, it is said that three distinct races of cattle were found, and now several other races have been brought into the country.

1. The Long-horns. These were originally from Cumberland, Lancastershire, Northumberland and other high regions in the north of England. The old Craven bull was a type of this stock, and looked upon as the best. The race has also been spread over Ireland, in Tipperary, Limerick, Munster, and other counties.

The breed has been greatly crossed and modified from the original. The first races were remarkable for the enormous length and bulk of the horns, and were large, strong and hardy. The general form rather coarse, limbs large and bony. But the cows yielded milk remarkable for its richness.

2. The Devonshires, Herefords, Welsh, and the Scotch Highland cattle. The horns of these cattle are of moderate size, fine, well turned, sharp pointed, limbs clean, animated countenance, figure compact, fatten readily. The cows yield rich milk, and are known as middle horned cattle.

3. The Galloway and Angus ox, which were hornless, and are called polled cattle. The original country of this race is situated in the extreme south and western part of Scotland, next to the Irish Channel. The majority of this race of cattle are black, but I have seen some of a deep blood bay color. Vast numbers of these cattle are driven to Norfolk and Suffolk counties in England, and are fed for the London market, where they are highly esteemed for beef. It is this race which has been crossed on the native cattle of Norfolk and Suffolk, and have produced one of the best stocks in England. A cross breed is of a dun color. Another cross seems to have been made with the white Chillingham Park cattle, which are also found in Northumberland, Lancashire, Yorkshire, and Cheshire counties. The legs of this cross are mottled more or less with black, the roof of the mouth and tongue are spotted with black.

4. The Alderney cattle are known to be of a French origin, and are not one of the original races in England. The islands on the south of the English Channel, next to the coast of France, are called Jersey, Guernsey, and Alderney. The Normandy and Alderney cattle were at an early day bred in Sussex, Hampshire, and other counties in England along the coast opposite to France. Inland the stock was much crossed on the English races, with the Devons and Herefords, most successfully. The Alderneys and Normandys produce an excellent quality of milk, and being crossed with the English stock make good milkers and oxen, which put on fat readily.

In the year 1522, Henry 8th, king of England, sent an army into France and took many towns and cattle. In 1523, this ex-

pedition was repeated, and the English army penetrated into the centre of France, plundering the country of their cattle, sheep, horses and swine.

No less than 14,000 head of neat cattle, and 14,000 sheep, and great numbers of horses, were plundered from the French people, and brought into the south part of England along the coast of the English Channel. These cattle were brought from the departments of Brittany, Anjou, Maine, Normandy and Picardy, in France, and disposed of in England to the English farmers and crossed on the English cattle.

Cattle from the southern and western coast of France and Belgium, have always been known under the denomination of Alderney cattle, and have been much crossed on the English native stock.

5. The white Chillingham Park cattle are supposed to be an original race in England, but this type is found in India and in various parts of Europe, and was the favorite ox of the ancient Romans, even before the days of the Cæsars. These cattle in England were earliest known to have existed in Lancastershire; and the waste lands in Craven, in Yorkshire were formerly ranges for these white cattle; so also the highlands in England, next to the mountains in Wales. The favorite animal of this race is a pure white, with red inside of its ears, and small red spots about the head.

6. The Durhams and the old Shorthorns and Yorkshire cattle are said to have been imported into England from the continent at an early day. These cattle have been the stock upon which the improved Durham or Short-horns have been raised by a cross on the Red Galloways. The Teeswater cattle in Durham and Yorkshire are descendants of this stock. They are all known at this day as Short-horns.

Scotch Cattle.

The Scotch cattle are of a mixed race. Many are black and hornless. Some are white, which appear to be the same stock as those of Chillingham Park, in England. The mountains of Scotland were originally a nursery of a race of black cattle, of mild aspect, beautiful symmetry, vigorous, hardy, patient of hunger

and cold, fattening rapidly, and were closely allied to the ancient Welsh cattle. These cattle are mostly middle-horns, and are called Kyloes. They are also found in the Hebrides and Western Islands. In the Orkney Islands, at the extreme north of Scotland, the same race is found, but stunted by cold and want of food. In Argyle, these cattle are, many of them, models of beauty, and seem to have been descendants of the old Caledonia stock, which were in early times a mild race. In Ayrshire, in Scotland, is found the Ayrshire cow, an admirable breed of milkers, as well as a good stock for the butcher. This is an improved breed, and a cross on the Durham or Holderness, or perhaps the Alderneys.

The king of England, Henry 8th, at various times sent expeditions into Scotland, to plunder it. The first expedition was sent in 1523, and again A. D. 1545 and 6. The expedition passed North to Edinburgh and into Perthshire—it ravaged Dumfries, Lanark, Stirling, Berwick and Roxburgh, and other counties in the south of Scotland.

These expeditions brought away more than 15,000 head of cattle from Scotland, 12,000 sheep, 1,500 horses, and swine without number, and the plunder was sold into the northern and eastern parts of England and north of the river Thames; hence the Scotch cattle became crossed upon the eastern races of cattle in England. Norfolk and Suffolk counties, in England, have for centuries, been famous for their herds of Scotch cattle, procured from the Highlands, to fatten for the London market.

The last of these expeditions was scarcely seventy-five years before the first settlements were made in New England, and the original races of cattle brought into North New England had been thoroughly crossed with the Scotch cattle before the landing of the pilgrim fathers.

Irish Cattle.

In the north and middle parts of Ireland the English Long horns and Scotch cattle have been extensively introduced. But there is a native stock found all through the southern and western highlands of this country. It is a middle-horned stock, and better known as the Kerry cow. The animal is generally of small size, as found in the country, but is active and vigorous, of a variety of colors, some black, red, white, brindle, and mottled colors. The cow

yields a fair proportion of excellent milk, according to its size, and fattens quickly, and when fed prove excellent milkers. This breed now partakes of many of the traits of the early English cattle, which were small, hardy, healthy, good and spirited for work. It is in its native state looked upon as an inferior breed, as all the original races in England, were in the days of the Edwards and Henrys. Many of these cattle have come into Maine.

The *Holderness* cattle, are an ancient race, which existed from very early times on the western coast of Europe, extending from the Baltic Sea to the confines of France. They were celebrated for the great quantities of milk which they yielded, and some of them had an extraordinary aptitude to fatten. They were introduced into the northern and eastern parts of England at a very early period.

Durham Oxen and Cows.

This race of cattle have been called the Teeswater cattle, from the river Tees, in the north of England. The breed were brought into the north and eastern parts of England before we have any historical accounts put on record. The counties of York and Durham, in England, were the original location of this breed. The old Durhams were said to be slow feeders, but since 1801, the race has been crossed on the Red Galloway, or Scotch or polled cattle, and is now called the best stock of England. One of these oxen weighed 3,780 lbs., live weight; and when slaughtered, the carcase was supposed to weigh 3,180 lbs. These are among the largest cattle now in England. The original Durhams were said to have been first crossed on the wild white breed of cattle of Chillingham Park, in the county of Northumberland, and in Lancashire; also, they were formerly much crossed with the bulls and cows from Holland. At this day the new Durhams are a recent and artificial race of cattle, with very few of the original types remaining. Holderness is in Yorkshire, England, but this section of England was formerly more mixed with Dutch cattle than any other. Great bulls were formerly brought over from Holland, and esteemed the criterion of perfection for cattle. These Dutch cattle were used to improve the breed of Short-horns coming down to 1790; this was before the improved Durham cattle

made their appearance. The White cattle were known in Jutland, Denmark, Hanover, Oldenburgh and Holland, from the earliest periods. They are of a Danish stock; the Danes ravaged the continent of Europe, from the Baltic Sea to France and England, for more than three hundred years; from A. D. 778 to A. D. 1080. In A. D. 800 they conquered Northumbria, in England, which comprised, amongst others, the counties of Yorkshire, Durham and Northumberland, and held it for more than 270 years. Prior to the year 1225, the Short-horn cattle are known to have existed in the north of England. The White cattle and the Short-horns are believed to have come from the Continent to England at the same time, and this accounts for the fact that very many of the Durham cattle are almost a pure white; and the fancy race of this day is mottled, red and white, in equal portions.

The Yorkshire Cow.

The Yorkshire cow is a native of Yorkshire, England, and came from the early race of Short-horns. These animals are some of the best milkers known, and have given (in rare instances) thirty-six quarts of milk a day; it is by no means uncommon for them to give thirty quarts a day. This cow is a great favorite; she yields more milk in proportion to the quantity of food consumed by her, than can be found in any other race. This cow occupies almost exclusively the best dairies in England.

Leicestershire Ox.

This race are long horned, and are one of the earliest races in England—healthy, strong and hardy.

The Cheshire, Derbyshire, Staffordshire, Oxfordshire Warwickshire and Wiltshire cattle all wear long horns. They are properly called the "long horned race." Westmoreland, Cumberland and Lancastershire, in the north-west of England, was the native land of the long horns. Bakewell, in his time, selected this race to breed from, and he succeeded in an eminent degree. Bakewell was born at Dishly, in Leicestershire, in 1725.

The Derbyshire and Cheshire cattle, as well as the Shropshire cattle, were originally long horned, and by being crossed with the original short horns, they have made a very fine race of cattle—docile and giving great quantities of milk. The strong-

hold of the long horns was in Craven, in the West Riding of Yorkshire, and Lancashire and Northumberland, but at this day they are not so often seen as formerly. From the Highland counties in the north of England, the race was carried south towards Wales, and into the southern counties in England.

Sussex Cattle.

The old Sussex ox is one of the best in England. It has always found a ready sale in London market for beef. This is a large animal, well formed, with a fine head, neck and horns. When crossed with the Herefords, produce a large, strong ox, vigorous, good and obedient workers. The Sussex cow is principally kept for breeding. The milk is in small quantity, though excellent in quality. She is therefore not a favorite amongst the dairymen. The males of this race are amongst the best for working oxen in England and America, and the females for breeding. The stock are much found also in Kent and Surrey counties. Sussex is a county in the extreme south-east part of England, on the English Channel, bounded west by Hampshire county and north by Surrey. The prevailing color is a blood bay. The barrel well formed, capacious, back straight, hips wide and well covered, and the hide mellow. I have noticed many oxen of this type in New England; in Connecticut and on Connecticut river, in Massachusetts. Many of this stock were brought into this country by the New-Haven colony. The original race of Sussex appear to have been much allied to some types of the Devons, but they had not so fine horns, nor were they possessed of the agility of the Devons. Many of the feeding grounds in Sussex are rich marsh lands, but the Devonshire stock are from mountain districts.

Cheshire Cattle.

These cattle are from the extreme west of England, near Liverpool. These were originally the long horned cattle from Northumberland, crossed on the Scotch, Lancastershires and other races. The stock has been long known as good milkers—cows had large udders. The belly deep, with prominent milk veins. Some of the cows have been known to yield twenty-four quarts

of milk a day, and ten quarts a day during the whole season. Cheshire has long been known and renowned as a dairy county in England. There are complaints that the cheese in Cheshire is not what it formerly was. Indeed, American cheese is now sought for and used in the Cheshire hotels. The artificial grasses, cabbage and swedish turnips deteriorate the milk, and we are sure that this kind of food will not compare with the Indian meal for fattening beef. The English beef is spongy, dull flavor, and is far behind the beef made from Indian meal, both in flavor and substance. It is said that the Cheshires cross well on the short horns, but it is doubtful whether a total alteration of the old breed is beneficial. Inured as it is to the climate and pasturage of the native hills, modified as it has been by a combination of circumstances in such a manner as to meet the views of the farmer and dairyman.

The Welsh Cattle.

These are from the original native breed of cattle which existed in the country before the Roman invasion. They are represented at this day by what is called the "Pembroke cattle." Great Britain does not produce a more useful animal than the Pembroke cow or ox. It is black. It is one of the ancient stock.

Anglesey Ox.

Anglesey is an island on the extreme north and west of Wales, south of Liverpool, connected with the main land by a chain bridge. Ten thousand cattle a year have been bred on this island, and on coming to maturity driven to the eastern part of England to fatten for the London market. The Welsh cattle are generally black or dark colored, astonishingly hardy, vigorous, full of health, round barrels, elevated and well spread shoulders, chest deep, forehead flat, horns rising boldly up, broad chines, roomy hips, and are a race that put on fat early.

Wales has always been a remarkable country. The land of Cambria was renowned even before the days of the Romans. It is a mountainous country, looking right over into the Western Ocean, and is about one hundred and fifty miles long, and eighty

broad. It contains twelve counties, and sends twenty-four members to Parliament from the counties, besides the borough members. It is the country to which the ancient Britons fled when England was invaded by the Romans, the Saxons, and the Danes and Normans successively, and in 1283 was the first time it submitted to a foreign dominion. The general face of the country is bold, romantic, with ranges of lofty mountains and extensive valleys. The cattle in this country have always been numerous, strong and healthy; in color inclining to the black. The stock is an original race far back in the annals of time, before any historical memorials appear. Pembroke, Glamorgan, Radnorshire, Flintshire, Monmouthshire, Montgomeryshire, and other counties, contain different herds, sometimes called distinct races. In many places the cattle are of all colors; by crossing it is changed to brindle, brown, red, bay and black, with white faces and bellies, or red with white faces and bellies.

No less than four counties of Wales border on the Bristol Channel; besides Hereford, Shropshire, Cheshire and Gloucestershire, Warwickshire, Worcestershire, Devonshire and Somersetshire, are in its immediate neighborhood.

The American people, in early times, came very much from Wales, especially into Rhode Island, the southern part of Massachusetts, and the eastern part of Connecticut, bringing their cattle with them. The Welsh people have ever been renowned for their love of liberty and independence, and it is said that no less than sixteen members who signed the American Declaration of Independence in 1776, were descended from different families in Wales; in other words, they were the descendants of Welshmen.

Glamorgan Cattle.

These cattle are from the ancient Welsh cattle. They have a great aptitude to fatten. They are stout and active, strong for husbandry, and seem to be closely allied, in their habits, to the Devons.

The Glamorgan cattle were originally esteemed one of the best breeds in England. They were of the ancient Welsh stock, but more or less crossed on the Devons. The old feeders in Leicestershire, Warwickshire, and Wiltshire were in the habit of pur-

chasing these cattle for their stalls for fattening. The Warwickshire people have themselves long possessed breeds of cattle of a superior kind, which seem to have been a race of long horns with a cross of the Herefords and Alderneys. George III. had a well selected stock of these Glamorgan cattle on his farm at Windsor. Indeed, the fattening qualities of these cattle and and other Welsh cattle were proverbial. The best cross on this breed is said to be on the Ayrshire, of Scotland, producing a hardy animal, apt to fatten, a good milker, and when fed affording excellent beef. The color of these cattle was red and brown, with a small head, lively countenance, neck well arched, carcass round and well turned, good workers and docile.

Montgomeryshire Cattle.

This county is situated in the highlands of Wales; it possessed two distinct races of cattle, one from the hills, red, brindled and black; the animal was healthy, hardy, apt to fatten, and made a strong, light ox, quick at work, full of spirit, but the cows were said to be inferior milkers. The other race was found in the vale of the Severn river. The ox fattened readily; the color was brown with white under the belly, the horns slender, but well turned. The cows, when properly fed, were good milkers and made excellent cheese. This race is evidently a cross on the Devons and the old Welsh cattle.

The Severn river heads in the mountains of Wales; after running east into England, it then turns south and finds its way into the valley of the Bristol Channel, which was formerly the great place of embarkation of the Pilgrims to America.

The Hereford Cattle.

The Herefords originally were a brown, or red brown, and a bay red, with not a white spot about them. They originally had almost exclusive possession of the county of Hereford. This county lies along the extreme west of England, adjacent to Wales. These oxen were considerably larger than the Devons; they are higher and broader, heavier in the chime, rounder and wider across the hips, better covered with fat, eyes full and lively, forehead broad, good horns, long neck, head small, chest deep,

broad and full, loins broad, hips wide, rump level with the back, barrel round and roomy, carcass deep and well spread, ribs broad and flat, flesh mellow and soft. These cattle fatten to a greater weight than the Devons—they are docile, of great strength, adapted for heavy work, rather active, generally not considered the best for the dairy; when crossed on the Devons they materially improve each other. The Herefords are said to be an aboriginal breed, and descended from the same stock as the Devons. When fattened the beef is said to be fine grained and beautifully marbled. The ox fattens kindly, and they are much esteemed in the London market. When a cow is inclined to give a large quantity of milk, the breeding qualities of the animal are lessened, and the form of the animal is deteriorated. They were considered one of the best breeds for graziers and butchers in England.

Devon Cattle.

The Devons prevail in the south and south-western counties of England. They are a deep red color, beautiful in the highest degree, in activity for work and aptitude to fatten altogether unequaled Great numbers of these cattle were shipped by the Pilgrims from Plymouth, Bristol, and other ports in the south of England, to Plymouth, Massachusetts, Boston Harbor, Martha's Vineyard, to Barnstable, Massachusetts, to Rhode Island, the mouth of Connecticut river, and to Milford, Connecticut, and the mouth of the Housatonic. With the Devons came also the Herefords, which were usually of a darker red than the Devons. There came also to New-England formerly Sussex cattle, as well as the Norfolk and Suffolk races. They were originally a middle-horned ox. Many of the first settlers in New-England brought their cattle from Surrey and Kent counties, situated south and east of London, and from Southampton; along with these came many of the Alderney cattle. At a later day cattle came into New-England from Coleraine and Belfast in Ireland. The west highland oxen came in along with these, the Galloways and the Ayrshires. At the present time the New-England cattle are a mixture of mixtures. In 230 years they have become an entire new race, in another county, in another climate, in another field of vegetation—strong, hardy and healthy in a remarkable degree.

I never knew one of them to die of catarrh, consumption or gout. The per centage of mortality is less among the New-England cattle than among any other race.

The Leicestershire cattle were brought into Massachusetts in 1629, by Francis Higginson, Esq., who brought one hundred and fifteen head of neat cattle. The Leicestershire cattle give a very rich milk, both for butter and cheese. The Stilton cheese is made from this milk, from cows fed on the hills in Melton Mowbray. In 1626, a bull and seven cows were sent from England. These were supposed to come from Wiltshire to Cape Ann. In 1625, the Dutch West India Company imported from Holland into New-York one hundred and three animals, with horses and swine, for breeding.

The Gloucestershire Cattle.

Gloucestershire is in the southern part of England, situated on the River Severn, up from the Bristol Channel, north of Wiltshire, and south-east of Herefordshire. This was formerly one of the best dairy counties in England. A great quantity of cheese was formerly made in this county; it is of two sorts—the single and double. The first was made of skim milk, or from a mixture of skimmed and pure milk. The double from pure unskimmed milk. The best cows have been known to produce twenty-four quarts of milk a day for seven months after calving. It is said that the original race of cattle in this county was small, of an indifferent figure, but were well adapted to active work in a hilly country. The color a reddish brown.

A cross on the old Long-horns of Wiltshire produced a larger race, with a tendency to fatten. Crosses were made at an early day upon the Durhams and Yorkshire, and the old Short-horns, which produced animals of good milking qualities, remarkable for milk, large in quantity and rich in quality; it is said that the Herefords and Devons were much sought after for crossing. A great many of this race of cattle were brought into New England, especially into the old Massachusetts colony in the county of Middlesex, and into the Plymouth colony.

Somersetshire Cattle.

Somersetshire lies east of the Bristol Channel, and north-east of Devonshire, joining the two, and producing the largest cattle in England; a cross on the Short-horns, Herefords and Long-horns.

This was also a noted dairy county in England. The cheese of Somersetshire is celebrated for its good and rich qualities. The dairy farmers sell off their cows at the age of twelve years. The milk now begins to deteriorate and lessen in quantity. The original race of cattle in this county were the South Devons, but they were early crossed on the old Short-horns and the Durham stock, producing one of the best breeds of milkers. It is said that the improved race are of a superior quality, andnearly equal to the short-horns in the quantity of their milk. This county, lying upon the Bristol Channel, supplied many cattle for the first New England settlement.

Dorsetshire Cattle.

Dorsetshire, England, is bounded on the south by the English Channel, west by Devonshire, north by Wiltshire and east by Hampshire. The towns of Dorchester and Weymouth, in this county, lie right opposite to the islands of Alderney and Jersey, on the French coast, looking right over to Normandy and Brittany. The original race of cattle in this county were said to have been a race of South Devons, but crossed upon the Alderneys and French cattle. The Durhams and Herefords were early brought into this country.

Dorsetshire has ever sent great quantities of butter to the London market, as well as cheese made from skimmed milk. It is one of the noted dairy counties in England.

It is said that the long-horns of Wiltshire were formerly crossed on the Dorsetshire cattle. This breed was early known and noted for two qualities—good for the milk and for the stalls. Many of the early Puritans came in from Dorsetshire to New England; (the Dorchester people were almost entirely from this county.) The soil of this county was generally rich and fertile. The climate was rather mild and congenial. Old Dorchester was the capital of the county, while Portland was a seaport town of notoriety, as well as the towns of Weymouth, Bridgeport and Wareham. The people from Dorsetshire liberally supplied themselves with cattle when they came into New England.

A modern writer declares that there is no breed of cows in England superior to the French cows from Flanders, Normandy and Brittany, for the quantity and quality of their milk, nor for

the proportion of milk given for the quantity of food consumed; That the best cows in the British empire are the Alderneys; that a large number of heifers are sold annually into England, where they are in great request among the wealthy classes for the dairies.

Many of the early cattle brought into New England, were from towns along the English Channel, Bristol Channel, and the German Ocean. Falmouth was at one time a port of embarkation. Berwick, York, Plymouth, Weymouth, Southampton, Brighton, Portsmouth, Newport, Barnstable, Biddeford, Dover, Chelmsford, Colchester, Ipswich, Yarmouth, Norwich, Lynn, Boston, Hull, Beverly and Scarborough, were all maritime towns on the southern, western and eastern sides of England, and places of embarkation for the Pilgrims.

Derbyshire, Wiltshire, Shropshire, Oxfordshire, Worcestershire and Warwickshire Cattle.

These were a race of Long-horns, strong, healthy animals, and when fed well in the pastures the cows were good milkers. The animal was rather raw-boned and stood high feeding well.

The Wiltshire cattle were esteemed some of the best in England. Many of these were brought into New England by the first Pilgrims.

The Warwickshire cattle were nearly allied to the Leicestershires; indeed the Leicestershires, Derbyshires, Oxfordshires, Staffordshires, Wiltshires, and Shropshires were all originally descendants of the Long-horns of Craven and Cumberland. The Long-horns were one of the strongest, healthiest, and hardiest race of cattle in England. This animal by a cross on the Holderness has made a strong, large, and vigorous race. The cow gives a great quantity of milk, and has become an excellent dairy animal.

The cattle from the Midland counties in England, have ever shown themselves a strong, healthy and superior race, and when transplanted to America easily become acclimated, and now furnish many of our best cattle for beef and milk. They were races of cattle that perpetuated themselves on the New England mountains to very great advantage, making strong, large, healthy, and rather bony animals; but when come to maturity and fed well, produce some of the best beeves for market in New England.

They are all excellent cattle for heavy work. The Short-horn stock are generally animals which give a large quantity of milk; but the milk is not very valuable for cheese or butter, and the cattle are generally not strong for work. They are feeble compared with the Long-horns or the Middle-horns. They generally put on flesh very quickly, but the cattle of this description do not furnish so fine or healthy beef as the Long-horns. The polled cattle and the animals, generally speaking, belonging to the Short-horn race, are not so healthy; they breed out easily, and do not retain the good qualities of the parent stock for any great length of time. The people of the eastern part of England are aware of this; hence they are continually procuring droves and herds of cattle from Wales and Scotland, and from the mountain districts in England. Parties who read the proceedings of *English Agricultural Societies* will discover that the prize animals mostly come from or are bred in the hilly regions of England, or among the mountains in Wales or Scotland.

The town of Barnstable, in Barnstable county, Massachusetts, is in the southern and eastern part of the State, at the lower end of Cape Cod bay, within the old colony of Plymouth. It derives its name from the old Seaport and Borough town of Barnstaple, in the county of Devonshire, situated in the extreme southern and western part of England, in the county of Devonshire, adjacent to Cornwall, and south of the British channel, at the head of the Biddeford bay, or as it is often called, the Barnstable bay. This town, in New England, was settled in 1639, by a colony under the Rev. Mr. Lathrop, who had been imprisoned at Barnstaple, in 1832, because he held to the doctrine and practices of a Free Congregational church.

The old North Devon cattle, were early much brought into this part of New England, as well as the Herefords, the Alderneys and the Sussex ox, and Welsh cattle, including the Pembrokes and Glamorgans, and the Long-horns of Wiltshire.

The towns of Sandwich and Scituate, and some others around Massachusetts bay, were settled by emigrants from Kent and counties in the east part of England, and subsequently to the landing of the first Pilgrims at Plymouth, in 1620, and about 1633 to 1639.

Soon after the settlement at Plymouth, the remainder of the Congregation at Leyden, in Holland, turned their faces towards New England.

The Puritans in England, Scotland, Wales and the North of Ireland in 1638, began to emigrate to New England. But the people from the southern part of England, and the country in the west, bordering on the rivers Avon and Severn, and the British channel, sought New England in greater numbers than from any other regions of the mother country. Then followed the Scotch and North and East of England Puritans. Many of the first Pilgrims were from the midland counties in England, and from the country west and south of London.

Within twenty years after the Plymouth colony was begun, almost every town and village in England had its representative in New England.

Along the Massachusetts bay, the old North Devons, the Welsh cattle, the Herefords, the Alderneys, the Suffolk and the Sussex cattle, were brought in by the first emigrants, in great numbers; also the Long-horns from Wiltshire; the Scotch and North of Ireland cattle followed afterwards. The Suffolk and Norfolk cattle were good milkers. The Yorkshires and Durhams were also imported into Massachusetts bay by the early Pilgrims. I have within a few years seen working oxen in the eastern part of Massachusetts, which strongly put on the Devonshire types; and also the progeny of the Suffolk Duns; also of the old Long-horns of Lancastershire.

The islands of Martha's Vineyard and Nantucket, and the adjacent islands, were first settled by colonies of Puritans from Scotland and North of Ireland, and from Southampton, England, in 1651. The colony from Southampton, came in under the two Thomas Mayhews, father and son, while the Scotch emigration came under the patronage and auspices of the Duke of Lennox and Sir William Sterling, two Scotch gentlemen, who sent great numbers of Scotch Puritans to settle in New England. The Argyle cattle, the Ayrshire, the Angus ox, the old red Sussex cattle, and the Suffolk Duns; the Alderneys and their crosses were sent to these Islands by the early Pilgrims; also the Welsh cattle.

The people from Scotland and Ireland, were many of them fishermen, who have by their descendants continued the business to the present day; but the first emigrants knew what good cattle were and where they were to be found, and availed themselves of their knowledge and experience when they emigrated to New England.

The first settlements at Taunton, Massachusetts, were from the old town of Taunton, in the county of Somersetshire, England, and also from Devonshire, and the country around the Bristol channel. The towns of Pembroke and Swanzey, in Massachusetts, were named from places of embarkation in Wales; so was Newport, and other towns in Rhode Island. The old North Devons, the Long-horns of Wiltshire and Somersetshire, the Herefords, the red Glamorgans, the Pembrokes, the Anglesey cattle, were introduced here at an early period.

The Welsh people, from the earliest history, have followed the business of breeding and exporting cattle, and the early Pilgrims when they came to New England, procured a large portion of their cattle from Wales, and the country around the Bristol channel. But the Puritans came from Scotland, Wales, England and the North of Ireland to New England, united in one sentiment of religious freedom and hostility to the arbitrary and tyrannical government of the House of Stuart, which then sat on the British throne.

The east end of Long Island, including the county of Suffolk to Hempstead, was first settled by people from Boston, in Massachusetts; they brought in the New England cattle with them. The town of East Hampton was first settled in 1649, by about thirty families from Lynn, Massachusetts. The town of Huntington was settled by a colony from New Haven, in 1646. Smithtown was first settled in 1641; the people first came to Boston, and were originally from Gloucestershire, in the south of England. Southampton was settled in 1640, by about forty families, from Lynn, Massachusetts; these people originally came from Southampton, in England. Fisher's Island and Plum Island were settled with people originally from Hingham, Norfolk county, England. They came in by the way of New Haven. This colony

came from near one hundred miles north-east of London, not far from Lynn, on the sea coast. Hempstead was settled by a colony from New England, in 1643, that came from the old town of Hempstead, in Hertfordshire, England, situated on the river Gude, about twenty-three miles from London. While the town of Jamaica was first settled in 1656, by a colony from Milford, Connecticut, united with a few inhabitants from Hempstead. Newtown was settled in 1651, by a colony of English, from Massachusetts. But the town of Flushing was settled in 1644, by a company of Puritans, who had been residents of Flushing, in Holland. The Huguenots came to this place at the revocation of the edict of Nantes, bringing the Lady apple and the Bell pear tree, and other fruits, which they planted. The Long Island colonists brought many of the red cattle of New England with them, which have been thoroughly crossed on the Dutch cattle, brought in early times from Holland. The first neat cattle brought into Massachusetts, was by Edward Winslow, who came in the ship "Charity," from Plymouth. He brought a bull and three heifers; this was in 1624. Probably these were of the Devon stock.

The people who first settled Salem, which was in the year 1625, came from Dorchester, in the county of Dorsetshire, England, which is in the south-west of England. Another colony, in 1629, came from Leicestershire, in England, bringing with them one hundred and fifteen head of neat cattle, said to be mostly Leicestershire stock. Hence we find in the early settlement of Salem and the adjacent towns, races of Devons and Leicestershire cattle. The inhabitants of the town of Rowley are descendants of Yorkshire colonists. They came in first from England in 1638, bringing with them the old Yorkshire and the old Short-horns, and some of the white Chillingham Park cattle; while the inhabitants of Newbury, Massachusetts, in the same county of Essex, came from the county of Berkshire, in England. This is one of the middle counties in England. This settlement was made in 1634. The race of cattle here are the Middle horns. The people in Bristol county, Massachusetts, as well as those in Rhode Island and the eastern part of Connecticut, many of them came from Bristol, England, and from Wales. Swansea was at one time a

great port of embarkation, as well as the whole of the country round the Bristol channel. The Black Welsh cattle and the Pembrokes, Glamorgans and the Anglesey ox, and the Devons, seem to have come into Rhode Island, the Eastern part of Connecticut, and the southern part of Massachusetts. The Devons, however, were the favorite stock. They soon reached Worcester county and the central part of Massachusetts.

The town of Hingham, in Norfolk county, Massachusetts, was first settled by a colony from old Hingham, in Norfolk county, England, in 1632. These people brought their cattle with them, which were the Middle horn cattle. Some of the towns in Norfolk county were first settled from Devonshire and Plymouth. Many families came by the way of the Bristol channel. Braintree was settled from Devonshire. The great-grandfather of John Adams, President of the United States, came, as he said, from "the dragon persecution in Devonshire," to New England.

The counties of Suffolk, Norfolk and others on the eastern coast of England, in that day, was possessed of a race of cattle known as the "Suffolk Dun," a middle horned cattle. The cow was very much sought for on account of the extraordinary quantity of milk which she yielded. She was held, in the days of Henry the Eighth, to be a royal animal, and was painted on the national flag of England. This cow was celebrated for her milk in almost every part of England. Many of this race of cattle were brought into the counties of Middlesex, Norfolk and Essex, in New England, and were preserved as great milkers by the dairymen.

This stock has spread its progeny very much over the northern part of Massachusetts, and New Hampshire, and Maine, but it has been crossed by the Long-horns and the Yorkshire types.

These cattle, in the counties of Norfolk and Suffolk, in England, have been a good deal crossed out by the Galloways, and are looked upon as furnishing a new stock. The new race are now polled cattle. The colors are red, red and white, brindled, and a yellowish cream color. The Suffolk cow is not inferior to any other breed in the quantity of milk that she yields.

The cream colored cattle are also found in Maine. They generally excel both for milk and beef. The yellow cattle are good workers, quick for the plow and cart.

The first white inhabitants of Lynn, Massachusetts, came from Lincolnshire, and brought cattle with them. Here we find representatives of the old Lincolnshire ox, with a cross of the early Short-horns. The first colony came in 1629; they were farmers; but one of the most prominent men amongst them was Edward Ingalls, who was a tanner. He erected a tannery, and from that day to this, Lynn has been noted for its shoe and leather trade. In 1637, another colony came from the town of Lynn, in Norfolk county, England. They were also principally farmers; possessed a large stock of horned cattle, which they kept in one herd, and had a man to keep them. These people cut their grass in the meadows and marshes, which proved very serviceable to feed their cattle on. There were more farmers in Lynn, Massachusetts, at that time, than in any other of the early settlements. Their grain was Indian corn. One of the historians of that period says: "Let no man make a jest of pumpkins, for with this food the Lord was pleased to feed his people to their good content, till corn and cattle were increased."

At this day, the middle horned cattle mostly prevail in New-England, but there still remains strains of the Long-horns as well as the Short-horns.

In the year 1638, the New Haven colony was planted. They first came from London, after having sojourned at Leyden, in Holland. The inhabitants of Milford and Guilford, and other towns in New Haven county, came out the year following, from Kent and Surrey, bringing cattle with them; but very many of the inhabitants of Connecticut came by the way of the Bristol channel, bringing with them the Devon cattle, in great numbers, also the Sussex and Herefords; but there are more pure Devons in Connecticut than in any other part of New England. An early writer says, "that the first planters in New England were plain men, bred to tillage and keeping cattle; that a great deal of the same spirit has ever remained among these people." There is, says this writer, "a certain niceness and delicacy which still con-

tinues amongst their posterity, wherein the perfection of husbandry consists." These remarks will apply to the present inhabitants of New England, with many additional favorable items. In 1635, the first colony from Plymouth, Massachusetts, came across the country to Windsor, on Connecticut river. They brought a drove of cattle and other domestic animals with them. Before they got over the Connecticut river, the winter set in; the cattle lived in the woods and on the meadows, without shelter. These fed as well as those which were housed, but many cattle perished during that winter. The Dorchester people, who made up a part of the colony, lost two hundred pounds' worth of stock. The next spring came many settlers to Windsor, Hartford, Wethersfield, Farmington, and the towns along the river, from the Plymouth colony, bringing great numbers of cattle with them. The first inhabitants of Dorchester, Massachusetts, came chiefly from Devon, Dorset and Somersetshires, in the extreme southern and western part of England, bringing with them their cattle. These were the Devons and Alderneys; but the Devons were the prevailing stock.

In 1636, Messrs. Hooker and Stone started from Cambridge, Massachusetts, with a colony, for Connecticut river; the company consisted of one hundred and sixty persons, men, women and children. The brought with them one hundred and sixty head of neat cattle; the cattle fed upon the buds, leaves and grass found on the way; the people subsisted on the milk of their cows. This colony came to Hartford; they passed over mountains, through swamps, thickets and rivers; they slept on the ground, with nothing to cover them by night but the heavens, and passed through trackless forests, overhung with high and thick branches and green leaves, with grape vines, which canopied the whole, extending from tree to tree, fragrant with flowers. Mrs. Hooker was sick, and was borne through the wilderness upon a sedan chair, made by fastening two poles on the outside of two horses, one horse being placed ahead of the other, with a chair between the two; the horses were each guided by two men, and a boy on the back of each animal. They all came safe; but the planters in Connecticut had but few working oxen or instruments adapted

to husbandry, when they first landed in the wilderness. The deep red color was a favorite in early times for cattle, and they were very much brought to New England. The Herefords formed a very fine breed for fattening. Many of them were a deep red, with not a white spot on them; the cows were said to have been excellent milkers, some of them yielding seventeen pounds of butter a week. The Devons were better adapted to this country than most of the other races; they were full of activity, healthy, full of spirit and courage, broad foreheads, clean limbs, with a pleasing vivacity of countenance, full of agility, sure footed, capable of traveling at a high speed, with a disposition to fatten unequaled by most other races. Coming from a mountain country in England and Wales, the breed suited the soil and climate of New England; they readily acclimated. These cattle are quick and honest at work; docile, and not inferior milkers. The race of pure red cattle, however, seemed to prevail more in Connecticut than in any other of the New England States. The middle part of Connecticut, including the towns of Middletown, Wallingford, Berlin, Guilford and East Haven, Hartford, Farmington, Wethersfield and others, is now distinguished for a fine breed of improved Devons. Such a great variety of races being introduced into the country at its early settlement, many of the original stocks have been crossed out, forming an entire new race, superior to the animals of any other country. I have seen the Leicester and the Irish lopped horns, the Galloway ox with its progeny, mixed with cattle from Suffolk and Norfolk counties, England, the Shropshire, the Derbyshires, and many others of the Long horned race. These occasionally show strains with an enormous growth of horns. The Yorkshire cattle in New England have undoubtedly been the stock from which many of the best milkers are obtained. I have seen a small herd of cattle, mostly red, with a small band of white around the middle. My brother, now living in Hampshire county, Massachusetts, is working almost the best pair of cattle I ever saw; they are a white, with every mark of having descended from a cross on the Chillingham Park cattle; black noses, and black inside of the ears. Many of these crosses of color are found in Maine and north New England, and put on an orange or cream color.

Many of the people in Amesbury and Salisbury, in Essex Co., Massachusetts, about the Merrimac river, came from Wiltshire in the southern and western part of England. The first settlements were made here prior to 1640. They brought in with them at that time the Wiltshire cattle, which were the Long-horns, crossed on the Alderneys, the Devons and the Herefords with occasionally a strain of the Welsh cattle.

Salisbury, in Essex county, was named from the old town of Salisbury situated in the south of England. The county of Wiltshire lies east of Dorsetshire and Somersetshire, and south of Gloucestershire. It is fifty-three miles long, and embraces quite a large territory.

While the inhabitants who first settled Andover, in the county of Essex, came from old Andover, in the county of Hampshire, bordering on the English Channel, opposite France, many of the settlers of this town came in direct from England, bringing with them their cattle, and among the rest a race called, at that day, the Hampshire ox. This animal was closely allied to the Sussex, was crossed upon the Alderneys as well as the south Devons and the Wiltshire Long-horns, producing a large, strong animal, good for beef, work and milk; the color was generally red.

This part of England was formerly the resort of many of the early Saxons, who originated in the mountain country, in a region about the head waters of the river Elbe, in the middle of Europe, in Saxony and Bohemia. Indeed we may go to the highlands on the continent of Europe, north of Italy, through Austria, Bohemia and Bavaria, for the race of cattle which prevailed in England in early periods of its history. The Devon cattle were brought into England by the Saxons; but the Welsh cattle were an original stock.

The best cattle are mountain animals, and they do not improve in health by being sent to the lowlands, marshes and plains for breeding and pasturage. The town of Bilericay, in Middlesex county, Massachusetts, was named from the old town of Bilericay, in the county of Essex, in England. This is a beautiful, fertile and maritime county, bounded east by the ocean, south by the river Thames, which separates it from the county of Kent. In

early times it was noted for its butter; latterly it is called the Epping butter, which it supplies in greater proportions than any other county in the kingdom, for the London market.

The old Suffolk dun cow was formerly much found here, as well as a race of Short-horn cattle, imported from Holland and Belgium. They were good milkers, and when taken to the stalls produced great quantities of beef. The settlement began in this town as early as 1637; indeed many of the people in the counties of Essex and Middlesex, in Massachusetts, came in originally from the eastern and southern part of England, with their cattle. These cattle were generally good for the dairy; most of them were the Middle-horns; a few of them were of the Long-horns, some were Leicestershires, some were Yorkshires, and some Durhams, but not so many of the Devons and Welsh cattle were introduced into the old Massachusetts colony by the first settlers, as were into the New Plymouth colony, and into Connecticut and Rhode Island.

In looking at the statistics of Massachusetts at the present day, we find that Middlesex is one of the best dairy counties in the State. Worcester is the best, having produced 1,637,978 lbs. of butter, and 1,791,030 lbs. of cheese in one year. The stock of cattle in this county are the descendants of the races first introduced into Essex, Middlesex and Norfolk counties by the first Pilgrims.

Berkshire county produced 1,262,845 lbs. of butter and 2,658,192 lbs. of cheese. The old county of Hampshire, Massachusetts, produced 2,445,289 lbs. of butter within the same period. This county includes Franklin, Hampden and Hampshire.

The cattle of Berkshire county, Mass., came in originally mostly from the Housatonic Valley, and from the western part of Connecticut, and also from the Hudson river, including a large share of the original Dutch or Holland stock. The cattle of old Hampshire county came from the New-Haven and Connecticut colonies, and from Dorchester, which was at one time the headquarters of a large emigration. The same remarks will apply to many of the cattle first introduced into Worcester county.

The old Alderneys crossed on French cattle, on the Devons, the Sussex ox, and the Wiltshire Long-horns form a large and strong animal, among the best for beef and milk. Along with these came some of the Long-horns from Cumberland, Northumberland and Leicestershire, England. Indeed Miles Standish, one of the original Puritans, and the captain of the band that first landed at Plymouth, Massachusetts, was born in Lancashire, England, and was an officer in the British army before he joined the congregation at Lyden.

The county of Worcester, Massachusetts, received a very large supply of its original inhabitants from the Plymouth colony, and subsequently from Middlesex and Essex.

The Massachusetts colony had imported, by the year 1640, large numbers of the choicest of cattle. There had come into the colony up to this period 21,200 passengers in about 298 ships.

The Puritans were at great pains in settling their colonies and grants. It had cost them, by the year 1640, more than $1,000,000 for emigration to New-England. The people were mostly of high intelligence; they knew what good farming was, and what kind of cattle were necessary for their stock. Comparison and observation had given the eye of the Pilgrims the experience to discover and pick out the very best animals. Such were brought over by the early fathers.

The town of Medford, in the county of Middlesex, Massachusetts, was first settled by emigrants from Lincoln and Northampton counties, in the north and east part of England. Here were found the Long-horns and the old Leicestershire cattle, as also many of the Short-horn cattle.

Northamptonshire contained less waste land, and more seats of the nobility and gentry, than any of the other counties in England. The town of Northampton, England, has long been noted for its capacious markets, while the trade for boots and shoes manufactured in this county was very great.

The county of Norfolk, England, at an early day, produced great quantities of butter; while in the county of Lincoln the breed of cattle was larger than that of any other county in England, except Somersetshire. Lincoln has ever stood noted as an agri-

cultural county, in England. The old Lincolnshire ox was a Middle-horn. The county is a maritime county, on the German ocean.

The soil of Durham, East Yorkshire, Lincoln, Suffolk and Norfolk counties, England, is of the most recent formation, full of the remnants of exeuvia from the ocean. Many cattle from these counties were transferred to the counties of Essex and Middlesex, Massachusetts, and were the originals out of which a portion of the dairy cattle introduced by the first emigrants into the old Massachusetts colony, and subsequently into Worcester county and the south part of New Hampshire, were produced.

The town of Springfield, Massachusetts, was first settled in 1635, by a colony, under the old Plymouth grant, in England. William Pynchon, Esq., was the leader of this settlement; he got his commission in England. The colony first came to Roxbury, Massachusetts. The cattle brought in by this colony were the old North Devons, the Herefords, and Welsh cattle crossed on the Alderneys; they formed an exceedingly fine race of cattle for the new world. The grant to this colony was a tract twenty-five miles square, lying on both sides of Connecticut river, and including the towns of Suffield, Southwick, Westfield, West Springfield, Old Springfield, Sommers, Ludlow, Long Meadow, and Enfield, in Connecticut, embracing a very fine tract of country, exceedingly fertile, and well adapted to the growth of neat cattle.

Northampton, twenty miles above Springfield, was settled in 1653, by a colony from Springfield and Hartford, Connecticut. The land was purchased of the Indians. This tract was located along the west side of Connecticut river, embracing the towns of Northampton, Easthampton, Southampton, Westhampton, Norwich and Chesterfield. The descendants of the old Devons and Alderneys, Herefords, Wiltshires and Welsh cattle were the first stock introduced into this region.

Hadley, on the opposite side of Connecticut river from Northampton, was settled in 1656, by a colony that came from Hartford, Connecticut, and also from New Haven. This tract of country was also very large, and included some of the most fertile lands on the Connecticut river; it embraced Williamsburgh, Whateley,

Hatfield, old Hadley, South Hadley, Amherst, Sunderland, Leverett and Pelham. The New Haven colony and Hartford colony supplied cattle which were the descendants of the North Devons, Herefords, Alderneys, the old Sussex ox, and many strains from the Welsh cattle. Occasionally cattle would come into the valley of the Connecticut river from the Long-horns of Wiltshire, Worchester and Berkshire, in England, as well as strains of the Leicestershires, the Cumberland and Lancastershire Long-horns. These settlements in the valley of the Connecticut soon extended to old Deerfield, Greenfield, Northfield, and ultimately up the river, through New Hampshire and Vermont, to Canada. In passing up the valley of the Connecticut river, from Long Island Sound to Canada, a person will often see a race of Long-horns, apparently a progeny of the old Cumberland types. These cattle have large limbs, fine bones and carcasses; the horns very large, stout and long. The animal when young appears rather coarse, but when grown attain an immense size, exhibiting an ox which produces the largest quantity of beef of any similar animal known. These cattle come to maturity rather slow, but they will stand higher and longer feeding in the stalls than any other race.

There is no country in the world that furnishes better well fed oxen than the towns along the Connecticut river. The hills and pastures on each side of this noble stream are the most fertile of any in this or any other country, in grasses and feed for cattle while at pasture; and the broad valley of the Connecticut river yields hay, Indian corn and other grain superior to any other in America, and in quantities almost beyond comprehension; while the climate is clear, cool, generally rather dry, and the most healthy for the animal races. New England may be proud of her cattle, as well as of her men.

If our people bestowed half of the pains in breeding our native cattle that the English do, we would have a far superior race to any in the old world. The following are some of the qualities of the New England cattle:

First.—They are very hardy, free from disease and epidemics of every kind in a remarkable degree, with less mortality than occurs to stock in the old world.

Second.—The cows are more prolific in healthy progeny than any other class of cattle known.

Third.—The geldings and bulls when put under the yoke will perform more labor by the day, and continue labor for a greater length of time, and keep in better condition, than any other stock of cattle.

Fourth.—These cattle have more agility, more strength, more size, and will work better with the plow, harrow or cart, than any other race of cattle of their cost and expense of keeping.

Fifth.—The bulls and geldings travel well with large loads. The geldings are strong, patient, steady and honest, to a remarkable degree. It seldom requires more than the plowman to drive and govern his team.

Sixth.—When fed, they put on fat speedily. Their beef is of the sweetest and healthiest kind, juicy and marbled, and flavored better than any found abroad.

Seventh.—The cows are the best of milkers, acclimated for two hundred and twenty years, and the breed have been thoroughly crossed. The breed now is found suitable both to the soil and the climate—qualities demanded by all stock growers.

Eighth.—A breeder can make more money by the native stock to breed upon, according to the expense or capital, than from any other known race. They are profitable alike to the graziers, the breeders, and the butchers.

Ninth.—The flesh and beef, when killed, is of the best flavor, easily cured for barreling, and can be preserved with little care and skill, without much expense. These cattle are good and healthy feeders, and there is a greater yield of milk and butter from them than from any we have seen of the foreign cattle.

Tenth.—The quantity of milk which cows give when running on pastures during the spring and summer, must vary to a considerable degree, according to the feed and milking qualities of each animal. Fair cows, fed on a new pasture, and a small supply of Indian meal, will produce from ten to twenty-four quarts of milk per day. Many of the New England cows put on the lineal Yorkshire type, with large udders, fine teats, clean head, shortish neck, deep chests, large carcasses, straight backs, full

thighs, strong legs, yielding from twenty to thirty quarts of milk per day. The best milker in England is said to have given thirty-six quarts per day, yielding 372 lbs. of butter in thirty-two weeks, averaging twenty quarts per day for twenty weeks. Some of the cows from the mountains in New-York and New England, have done equal to this. But then a cow must be in thorough health, full grown, of a large size, fed on a new pasture, and with Indian meal, to enable her to come up to this point.

In the year 1812, Mr. William Baldwin, of the town of Litchfield, Conn., owned two milch cows, one a brindle, a cross on the Welsh; the other a deep bay color, with a white face and belly, a cross on the Herefords and Holdernesses. The white faced cow gave forty quarts of milk a day, after calving in the summer, and in the fall, when put into fresh meadow or rowen feed; but then she was fed with a mess of Indian meal and bran daily. The brindle cow gave twenty-two quarts a day, fed the same way, but yielded more butter than the white faced cow. These cows were undoubtedly pets, and the family nursed them. They were good for milk six months every year. An early writer declared, that all cattle were originally black. In this State they have the most vitality. The brindle was the next hardy and healthy, then the red, then the dun color, then the cream color, then the white color, which was the most feeble and liable to disease of all colors. The native turkey is black and of a copper color, and hardy. The domestic turkey becomes gray, then red, then a pure white, and is sickly. So the horse, the peacock, the guinea fowl.

Until within the last 300 years, the cattle in England were small, generally not well fed or housed in winter, furnishing but little good and fat beef. When the stock was transferred to New England it improved wonderfully in size and quality.

The fresh, clover pastures, fine hay, grown on the newly cleared lands, the Indian meal, all made a feeding to which the cattle in the old world were strangers. The hills and mountains in New England yield the richest pastures of any in the world, while the thousands of valleys along the rivers and streams yield hay and Indian corn unequaled in quantity and excellence of kind. It is on this keeping the New England cattle are fed and fattened, and

it is this keeping and feeding which has given them their superior characters for beef and milk, unequaled by anything of the kind found in the old world.

By the census returns of 1850, New-York annually produced 79,766,094 lbs. of butter; 49,741,413 lbs. cheese. Pennsylvania, 42,000,000 lbs. and upwards of butter. There are no such dairy herds in England or Europe as in New-York, New England and Pennsylvania; nor will the working oxen in the old world compare in goodness with the working cattle of New England.

The cold, damp climate of England and Scotland is not so favorable to stock as the pure, dryer air, clear skies, and summer vegetation of the New World. The snow in New England commences to fall the first of December, and continues to the 20th March, generally. It is dry and mealy, the climate is cool, dry and bracing, seldom damp and chilly. The mountains and hills furnish pastures for cattle, such as are unknown to the Old World.

Cattle bred here grow to the largest size, their lungs and chest become expanded, their bones and muscles strong, the barrel of the carcass large, full, roomy and round. The geldings have borne the yoke in their youth, and have experienced the good effects of it. Hence the working oxen are stronger, larger and better than any other, and make the best of beef when fattened.

The States of Maine, New Hampshire, and Vermont, have as fine animals as any other. Their stock originally came in from France, and from Plymouth, Bristol, Norfolk, Cumberland, Yorkshire, Denmark and Scotland, and from New England.

The Massachusetts colony began at Salem, in 1621, and continued till 1692. They brought along with them the "Yorkshire," the early "Short-horns," the "Lincolnshires," the "Norfolks," the "Suffolk Duns," the "Leicestershires," the "Devons," and the "Welsh Cattle."

Many settlements were made in New Hampshire and Maine, from the Massachusetts colony and the towns on the Merrimack river, bringing in their cattle.

The first grant of a patent of Maine extended from latitude 40° to 48° clear to the bay of Chaleur in Canada, and from the At-

lantic to the Pacific ocean. The grantees subsequently united merchants with them from London, Bristol, Exeter, Plymouth, Shrewsbury, and Dorchester, England.

A great many ships came out to Maine in the spring, year after year, bringing from various ports in France, England, Scotland and Ireland, more or less emigrants and cattle, and taking back a cargo of fish in the fall and winter. These ships would introduce cattle from almost every seaport in the realm. The people around Biddeford bay, in Devonshire, England, were, at an early day, engaged in fisheries along the shores of Maine and Newfoundland. Here were found the old North Devons, Cornwall and Welsh cattle. Thus we find the cattle of New Hampshire and Maine a more thoroughly mixed race than those of any other part of New England. They are the best of oxen for heavy work, and when fed well, for beef.

In almost every part of Europe and England, skulls of cattle have been dug up and found far exceeding in bulk any now known. There is a fine specimen in the British Museum. Such skulls have been found in the vicinity of the mines in Cornwall, England, showing types of the Devons, East Sussex, and Welsh cattle, as well as of the Scotch Highland cattle. Calves, when permitted to run with the cow, will suckle two years and longer. Mr. Pell, of the American Institute, killed a calf which had run and suckled two years; it then weighed, when slaughtered, 2,000 lbs.

The largest cattle can only be raised by letting the calves suckle until they wean themselves; at about two years of age the teeth have now become a new set, the milking teeth fall out, and the animal is now able with its large, firm teeth, to crop the grass and obtain a living for itself without the aid of its mother.

We violate the laws of nature when we wean the calves and feed them on skimmed milk, or undertake to control their feed; the stock now becomes stunted and dwarfish. There is no tampering with the laws of nature without producing injury, and breeders only want to follow those laws to secure the largest, the best, and the most profitable stock.

The farmers of New England have much neglected the breeding of stock. They do not seem to realize that they have the best stock in the world to improve on. It took all the best people out of the four kingdoms of the mother country to produce the institutions of New England. The cattle came along with the first settlers, and the cattle were the best that the old world afforded. Whilst the lumbering business lasted in New Hampshire, the breeding of large cattle was much attended to. Calves were allowed to run with the cows and suck at pleasure. Men were ambitious to be distinguished by the size and strength of their oxen. Bets were frequently made upon the exertion of their strength. The prize was contended for as earnestly as the laurels at the Olympic games. As husbandry has gained ground, less attention is paid to the strength and more to the fatness of cattle for the market. (See 3d Vol. of Belknap's New Hampshire, page 105.)

After the battle of Bunker Hill, in 1775, seventy-five patriots at Farmington, Connecticut, started for Boston, 110 miles distant. They took an ox team and cart loaded with salt provisions, peas, bread, camp utensils, with a puncheon of rum to cheer on their soldiers and to wash their sore feet. They came to Roxbury in nine to ten days—the oxen stood travel better than the men.

In 1778, the inhabitants of Durham, in Connecticut, sent to General Washington, at Valley Forge, two oxen, driven almost 500 miles through the country, greatly exhausted of its forage. These cattle furnished a dinner for the officers and soldiers of the American army. One of them, a steer, five years old, weighed, when slaughtered, 2,270 lbs.

The Welsh cattle seem to have been very much crossed out in New-England. The Reverend Mr. Buckley, of the town of Colchester, Connecticut, presided over the church of that town 1703 to 1731. A church in a neighboring town was much afflicted by dissensions; they applied to parson Buckley for advice; he wrote them an affectionate letter, told them to heal all their dissensions, and live in peace; but while the parson was writing the letter to the church he found he had to write one also to his tenant, who occupied one of his farms in another part

of the town. He sealed his letters, and in superscribing them, the one for the church was directed to the tenant, and the one for the tenant to the church. The afflicted church convened to hear the letter from parson Buckley read, which was to heal all their difficulties. In due form the Moderator broke open the letter in the presence of his assembled brethren, and read as follows:

"You will see to the repair of the fences, that they be built high and strong, and you will take special care of the old black bull."

This letter was deemed mystical. One of the elder brethren got up and said, this is just the advice we need. The old black bull is the devil, and we must watch him thoroughly. The fences must be built high and strong to keep out all strange cattle off our fold. Go home said the elder, obey your Divine Master. The meeting was forthwith adjourned, the people departed, the animosities subsided, harmony was restored to the afflicted church.

We are of the opinion that the old black bull, was one of the black native stock of Wales. Indeed a person traveling through New-England will see individual cattle which strongly represents every type found in England or along the western coast of Europe.

Many of the people called the Puritans originated in the north of England and the south-east part of Scotland. In the year 1607, some of them were driven from the north of England. They first settled in Amsterdam; two years afterwards they went to Lyden, where the colony increased with numbers from London and the south of England, and remained until 1640. In 1621, the first colony came to Plymouth, Massachusetts; these were a portion of the Lyden congregation, and other portions of the congregation afterwards came to Massachusetts; finally the last portion of them came to New-Haven in 1637 to 1640. On the 3d of November, 1620, King James signed a patent incorporating the Duke of Lennox, Sir Ferdinand Gorges, and thirty-eight others, styling them the "Council established at Plymouth, in the county of Devon, in England, for planting, ruling, ordering

and governing of New-England, in America." This company granted New-Hampshire to captain John Mason, and the province of Maine to Gorges. The first permanent settlements in Maine were begun in the year 1617, in the extreme south-western part of the State, next to New-Hampshire. The colony of Maine, was originally a grant from the Plymouth Council, in Devonshire, England. The colony remained under the Plymouth Company till 1677, when it was sold to the Massachusetts colony, and remained under Massachusetts government till 1820.

In 1622, Mason went to New-Hampshire, and a son of Gorges to Maine, as governor. Mason established himself at Portsmouth, and Gorges made settlements at various places along the coast, to Machias. Governor Mason imported a large breed of cattle from Denmark, and when he died some of his stock were carried to Penobscot, and some to Nova Scotia. In 1658 Francis Norton drove 100 oxen, a part of Mason's herd, from New-Hampshire to Boston, and sold them for $125 per head. This was the current price for the best cattle in New-England at that time. New Hampshire remained, with but few intervals, under the jurisdiction of Massachusetts till 1749, more than 100 years, when the two colonies were separated. Georges had been an officer in the British navy, under Queen Elizabeth, and James, in 1604, appointed him governor of the island of Plymouth, in England. Mason had been a merchant in London, but became a sea officer. The first people to settle in New-Hampshire came from London, Bristol, Exeter, Plymouth, Shrewsbury and Gloucester, and was called the Company of Laconia, in England.

In 1623 Daniel Thompson, a Scotchman, and Edmond and William Horton, fishmongers in London, came over with a colony furnished with all the necessaries to carry on their design in forming settlements in the country. Some of the earliest settlers were of good estates; some of great account in religion.

In 1638 a company came from Norfolk, England, and settled Hampton, New Hampshire. The Norfolk and Suffolk dun cattle were brought into New Hampshire and Maine at an early date of their history.

Mount Desert Island, in the county of Hancock, State of Maine, as well as many other islands about the mouth of the

Penobscot river and on the coast, were formerly much settled with French colonists, who came from St. Maloes and other ports on the north of France, bringing with them the French cattle. Many fishing vessels came from Marseilles, in the Mediterranean Sea. The race of Huguenots afterwards came into Maine in great numbers. It is said that Talleyrand, the great French minister under Bonaparte, was born of a Quaker mother on the Penobscot river. The cattle of northern and western France were originally well represented in many parts of Maine, as well as the western Highland cattle of Scotland. The fishermen of the west coasts of Ireland and Scotland were for a long time engaged in the fish trade of Maine. The New Hampshire and Maine colonies started with the best of stocks of cattle from Norfolk, Leicestershire and Devonshire, England, and afterwards obtained herds from the Massachusetts colony, which first started at Salem, with cattle from Norfolk, Leicestershire, and Yorkshire, and other parts of England. The Puritans were well acquainted with the value of the Short-horns; and the Yorkshire and the old Norfolk dun cattle, were all great milkers.

Large numbers of these cattle have been at various times brought into New England. The Yorkshire and the Norfolk and Devon types are found scattered over the best dairy districts in north New England, and our best milkers retain many of the Norfolk and Yorkshire forms of the original animals. These have been crossed with the Devonshire stock. A large portion of the cattle in Maine, are descendants of the Yorkshire, Leicestershire, Norfolk, and Devonshire races.

The working oxen in Maine are mostly red, with a strong cross of the Devons, and Yorkshires, and Leicestershire, and Scotch cattle. The *lumbering business* has trained up a race of oxen, possessing all and more than the original agility and fleetness and intelligence of the Devons ; while the carcass has been improved to a great size and strength, both for work and for beef. The whole race of mountain cattle in New England, is vastly superior to the original stocks of the old world. There are no dairy regions so good as those on the highlands of New England and the State of New-York, where the pastures are full of red and white clover.

The Galloway cattle are now a hornless race, but formerly were a middle-horned animal. They have lost their horns by debility or deterioration. New pastures—the buds and flowers of the grasses, shrubs and trees—yield the phosphate of lime and ammonia abundantly, which are necessary to form the bones and horns of cattle, and to give them a large, healthy and strong carcass. Old pastures and feeding grounds soon become exhausted of ammonia and phosphate of lime; hence the horns of cattle pastured on such soils become small and feeble; the horns fall off or do not show themselves; the animal loses its health and hardiness, and does not make a large, strong and healthy race. This is the case with the Galloways and polled cattle in England. These cattle can never equal the Long-horned races for beef, milk, or work, and are not much grown or cultivated in New England.

The Long-horns of Cumberland, Wiltshire, Lancashire, were originally brought into New England, and from these strains the Long-horn cattle show themselves. These cattle being crossed on the north of England cattle, generally produce the "*middle-horns*" which prevail in north New England.

In passing through New England, a person can not but observe fine specimens of every type of cattle known in the west of Europe, and occasionally he will see oxen with horns of enormous length.

The domestic ox, as well as the original wild ox, are naturally a mountain animal—they seek highlands; they like the clear cool air and pure spring water. When turned into a pasture to graze they go to the top of the hills, and at night select a little valley sheltered from the winds to herd themselves. The best butter, milk and cheese, and the sweetest beef came from the mountain ranges. There are no cattle that a man can own to so good advantage as the New England mountain cattle. A feeder can make more beef out of them according to his outlay, than from the best foreign stocks. When we import cattle we throw away our money, except when we import bulls into the country to cross on our native cow. The cattle from the old world have not constitutions adapted to our climate. Our native cattle have been acclimated for two hundred and twenty years. The cattle of Europe lose

caste by importation; they can not stand the extreme climate of winter and summer.

In the winter of 1799, the cold in New England was excessive. During the preceding summer, from the 28th July to the 1st September, the heat was intense, the mercury was from 86° to 93°; vegetation failed, drought was excessive, many trees shed their leaves in August, and many cattle perished in the cold winter following for want of food.

The town of Goshen, in Litchfield county, Connecticut, is on the most elevated land in the State. This and the adjacent towns is one of the best tracts for the dairying business. Cheese and butter are made here in large quantities, the fame of which is widely and justly celebrated. We are all familiar with the butter and cheese brought from Jefferson, St. Lawrence, Herkimer, Delaware, Sullivan, Orange, and other mountainous counties in the State of New-York. This butter and cheese is equal to any in the world, but no better than that made in New England.

The cattle in New England are well housed, especially in the winter. They are more docile than the original herds from Europe, healthy, hardy, and many of them are of a very large size, full of agility, and put on fat very fast when at the summer pastures or fed in the stalls. Many of the cows are excellent milkers; some of the best progeny of the Yorkshires, yielding in many instances from twenty to thirty-four quarts a day. The New England oxen are great travelers on the road. Wherever the New England people have emigrated to, they took their cattle with them. The cattle which make up the trains for California are mostly descendants of the New England stock. Their ability to travel and endure privations render them almost invaluable. The largest cattle in England weigh no more than 3,180 lbs. per carcass, while some of the largest carcasses of the New England cattle have weighed from 3,500 to 3,600 lbs., after being slaughtered. Indeed, there are no better cattle for milking, fattening and work. The grazier, the feeder, and the butcher and dairyman can find no better stock. The health of the New England cattle is exceedingly good; their horns and bones are strong; the horns set strong and well on the head. The true blooded

Devons, Sussexes and Herefords are better preserved in the State of Connecticut than any other part of New England, indicating that these were the original favorites.

Breeding Cattle.

In order to do this with success, the parents should be full-grown, selected of a good size, from four to ten years of age, living in a healthy country. A hilly country is much the best; neither the bull nor the cow should be stabled, nor be ringed. Both bull and cow should run at large, the bulls be accustomed to the yoke while they are calves, and kept fairly and moderately to work under the yoke in the open air, fed on fresh grass, hay, Indian meal, with boiled turnips, potatoes or carrots—stabled only during the winter. These bulls make the best working teams; strong, full of enterprise and courage—will plow deep furrows, draw heavy logs, cart good loads, make heavy stone wall. Indeed a breeding bull ought to be a working bull, and then they never have the catarrh, consumption or gout to afflict them, or to render their progeny feeble or sickly. The calves should come in the month of February and on to May. They should take the whole milk of the mother the first twelve to fourteen months, constantly handled to keep them docile. They will gradually wean themselves when their teeth and stomach become adapted to other food. After the first three months a calf ought to run in the pasture. When they begin to wean they should be fed with fine hay, fresh grass, and a small quantity of Indian meal. In the winter the cow is frequently injured by drinking cold water. It produces constipation of the bowels, and cholic. Two pailsful of warm water, with a half peck of rye or wheat bran during the day will keep the bowels free and open. I have known cows dried up by drinking cold water immediately after calving, with violent symptoms of inflammatory fever. In the winter season the cow had better drink warm water from the temperature of 55° to 64°, kept in clean, warm, and well ventilated stables. The calf needs a warm stable, with straw or chaff to lie on. The food must be upland hay. Cattle never do well on wet, swampy land, nor will they feed to advantage on hay grown in marshes, nor put on flesh when they lie down in damp,

cold places. Nor can cattle be fattened in the winter in the northern climates, without warm and dry stables, and a full supply of food of the best kind.

The cow should never be milked or suckled during gestation. All the milk drawn from the cow at this period of time is furnished at the expense of the growing fœtus. Hence the calves of the great milkers are generally feeble, poor and bad milkers. The first-born calves are the best. Primogeniture in raising stock is a law that *works well.*

The number of milch cows in Maine, by the last census, were 133,556; working oxen, 83,893; other cattle, 125,890. While the butter made yearly is 9,243,811 lbs.; cheese, 2,434,454 lbs. The town of Bangor, on the Penobscot river, sawed and exported in 1850, 200,000,000 feet of lumber. Vermont had by the same census, cows, 146,128; oxen, 58,577; other cattle, 154,143; Massachusetts, milch cows, 130,099 ; oxen, 46,611 ; other cattle, 83,284 ; Connecticut, cows, 97,277 ; oxen, 59,027 ; other cattle, 114,606.

Foreign cattle are not suited to the New England climate, and when brought into the country they are much like foreign trees and grape vines.

Solon Robinson—The gentleman has probably fallen into an error, and taken the live weight for that of the weight of the beef. To give thirty-six hundred weight of beef, an ox must weight forty-nine hundred weight, or more, alive; and I don't believe that this weight has ever been attained by any of the bovine race. If it has been, it can be again; and I will guaranty to the producer one dollar a pound for an ox alive of that weight. I hope the author will review and amend his statements before they are published. I am willing to concede all that he is disposed to claim, so far as facts will warrant, to the excellent breed of cattle common in New England. I am well aware that the best working oxen in the world, are the red oxen of Connecticut. These are nearly all descendants, in some degree, of the original importation of Devons into the country by Mr. Patterson, of Maryland, of whom the Messrs. Hurlburt, of Litchfield county, obtained their first Devon stock, in 1819. These were medium

colored, neither light nor dark red, like the native yellow red, or the deep blood-bay red of the latest importations. This Patterson stock had no white hairs upon any part of the body, and I do not think that they made as good working oxen or milk cows as the progeny of the cross of these imported cattle upon the natives—the Devons of Pilgrim importation.

Alanson Nash replied—That the gentleman that last spoke, Mr. S. Robinson, had misunderstood the tenor of his remarks, in regard to the amount and weight of beef made, either in slaughtering English or American cattle. That he (Mr. Nash) did not state, in his essay just read, that thirty-six hundred weight of *beef* had been made out of any one slaughtered. He stated, that the largest ox slaughtered in England weighed 3,780 lbs., live weight; and when slaughtered, the carcass was supposed to weigh 3,180 lbs., including hide and tallow, and all things except offal. That some of the largest carcasses of the New England cattle have weighed 3,500 to 3,600 lbs., after being slaughtered; this includes the whole of the ox, except the offal. That this was the rule adopted in England in estimating the weight of cattle, and the same rule should be adopted here. That the largest and best cattle in this country were not raised out of importations of cattle made within the last fifty years, but that the old original herds of New England, when well bred and fattened, produced the largest and best cattle. That these had been acclimated and adapted to our feed, climate and soil for a period of more than two hundred years. That people in this country had nothing to gain by importing English cattle to breed from. That if our own cattle were to be reared and bred, that we would soon have the best cattle in the world.

Mr. J. A. Nash said—That he was recently in England, and in Cheshire county, so long celebrated for cheese. He called for some of it, found it very good, although the reputation of Cheshire cheese had fallen off of late years. He said to the landlady, that it was better than he expected. She replied, that it was *American cheese*; she had bought it because it was so good.

The Club adopted the following subjects for the next meeting: "Winter preparation of and care of manure." "Treatment of stock." "Propagation of fish."

The Club adjourned. H. MEIGS, *Secretary*.

February 16*th*, 1858.

Present—Messrs. Lawton, of New Rochelle, Solon Robinson, Dr. Waterbury, Amos Gore, of New Jersey, the venerable Benjamin Pike, of New Jersey, Drs. Smith, Wellington and Bartlett, Messrs. Smith, Adrian Bergen, of Gowanus, Hon. J. G. Bergen, of Gowanus, T. W. Field and Dr. Peck, of Brooklyn, Mr. Davoll, Prof. Mapes, Messrs. Olcott, Stacey, Aycrigg, Leonard, Chambers, and others; about fifty members.

President Pell in the chair. Henry Meigs, Secretary.

[Journal de la Societe Imperiale et Centrale d'Horticulture, Napoleon Third, Protecteur. Paris, December, 1857.]

Extract translated by Secretary Meigs.

Mastic-liquid in cold weather, is of great importance in arboriculture, and brings now a pretty high price. To obtain it, we take 840 grammes (nearly two pounds) of common resin, melt it slowly over a fire, being careful not to heat it so much as to make it throw off its spirit of turpentine. When it is clear as a syrup, add 301 grammes (eleven ounces) of spirit of wine. Mix them well, and then as quick as possible pour the whole into a bottle, and stop it up tight. The alcohol is to be added, sufficient to keep it fluid. This, applied to trees, forms a perfectly sure covering, which in time hardens a little. One application is enough for grafts. A much smaller quantity of it than of any other material is sufficient. Young wood, cut, cicatrizes well under it.

Prof. Mapes remarked, that he uses nothing else for a long time past on his grafts.

Chauncey E. Goodrich, of Utica, presented a written and a printed article on the culture of potato from seed, &c., and on motion, (on account of other matter pressing for hearing,) were laid on the table.

Dr. Bartlett, editor of the *Albion*, presented for Mr. Wilson, from his new farm at Deer Park, L. I., (one of the most condemned tracts,) two ears of yellow eight-rowed Indian corn, grown with ordinary culture, last year, upon land immediately after it was cleared of its covering of bear or scrub oak. These ears are eleven inches long, and six inches round at the butt.

Mr. Lawton presented an ear of Zea maize, (Indian corn,) from the Rocky mountains. The grain is yellow, not as large as our common corn grains, each grain closely wrapped in a husk and strongly fixed on the cob. The ear is seven inches round at the butt, and eight inches long, while the cob is only two inches and a half round and extremely hard.

A combined, reversible, corn plow, and harrow and seed plow, patented by Henry Schreiner, jr., of Berrysburg, Dauphin county, Pennsylvania, was exhibited by him, and its qualities explained to the Club,

Paper pulp from white pine wood, was exhibited by Charles Marzoni, from Intra, on the Lago Maggiore of Italy—patented there.

SALT UPON OLD PASTURES.

Solon Robinson—Here is another seeker after knowledge. He wants to know if "sowing salt upon old pasture lands increases the growth of grass, and whether salt sown upon any dry lands increases the crops? Also, how much weight of guano, from actual trial, is necessary to sow per acre on fair lands, to insure a good crop of corn, and whether it should be plowed under or sowed on plowed land and harrowed in?"

In regard to the guano, my opinion is that it is always most profitably used upon land sown with small grain, thoroughly mixing from 200 to 300 pounds per acre with the surface soil, by the plow or harrow, and always sowing grass or clover seed with the grain. Turn this crop of clover or grass under to manure the crop of corn. If guano is to be applied to a corn crop direct, I would plow it in. As I am not an old salt, I will leave that question for somebody else to answer, for the benefit of "A Young Connecticut Farmer."

Prof. Mapes—An excess of salt upon land will kill all vegetation for the first year, except asparagus, but the land will afterward be found very productive. In England salt is recognized by Government as a manure of such value that it passes turnpikes toll free, and it is used by farmers at high prices. Here it is used to be thrown away by the pork packers, and I have bought it at four cents a bushel. Salt upon old pastures will

always improve them. It may be used from five to fifteen bushels per acre. It always does best upon land that has been limed. I would use it five to ten bushels per acre on old pasture. It is useful in all compost. It is largely used upon cabbage gardens near this city. If you slack three bushels of lime with the solution of one bushel of salt, it is the best thing ever used to decompose muck. It is also excellent upon the roots of peach trees. Guano is much more valuable when treated with a carboy of sulphurous acid to a tun. It makes the guano fine, so that all the lumps can be divided and mixed with the soil. I prefer to mix guano with super phosphate.

HOW TO GROW POTATOES AND PREVENT ROT.

Solon Robinson—I have a letter from A. Sprague of Harvard, Delaware county, N. Y., stating how he has succeeded in producing good sound crops of potatoes for fifteen years past, which he proposes to add to the discussion upon this very important question. He says:

"In the first place, I select dry and sandy soil. Plow and plant as early as the season will admit, say March, or April, and always by the 10th of May, in ground well plowed and furrowed each way, three and one-half or four feet apart. Cut your common sized tubers in four pieces, giving each piece a share of the seed end, and put from four to six pieces to each hill, down in the furrow where they cross at right angles. Separate the tubers, or there would be no benefit in cutting. For manure I take littering or straw, the coarsest I can find in my barn-yard, or clean out an old bay where a mass of short straw, dust and chaff has accumulated; or take stuff from under barn floors, that has laid a number of years untouched, and contains a quantity of nitre. Take a shovelfull, or forkfull, and throw directly on and over the tubers, then cover with earth, not leaving one straw uncovered if possible. In case the straw or manure lies loose, or quite dry, step both feet on the hill just finished, pressing tightly down. In conclusion, I would say your patch of potatoes will look doubtful of ever coming up or amounting to anything, until about the 20th of June. By that time the ground begins to crack and the tender stalk makes its

appearance. As soon as you can discern the rows, plow lightly among them, and loosen the crust on the top of the hill by the use of a hoe. In about ten or twelve days I plow the other way and hill up, making low, flat hills, and there let them rest until digging time, which is about the fore part of October. Potatoes planted in this way, you will find, are dry in the hill at digging time, in wet as well as in dry weather. The straw decomposing while the potato is growing, seems to regulate and keep it from all harm from the effects of changeable weather, keeping it dry in wet weather, and at the same time keeping moist in a drouth."

CUT FEED FOR CATTLE.

Solon Robinson read a letter from John Manross, of Hillsdale, Mich., upon the subject of cut feed for cattle, which, after speaking of the discussion held by the Club some weeks since upon the subject, in which it was stated that portions of the straw and corn stalks were found to have passed undigested into the lower intestines, the writer says:

"This may be true in part, and yet the practice may be good to a certain extent. Corn in the ear may make very good beef, though part of it may pass the animal undigested, to be devoured by some other animal less fastidious; and the practice may be not very economical, but that depends somewhat on the price and ripeness of the grain, and the convenience of grinding. Whether corn is seventy-five cents or fifteen cents per bushel is an important question in disposing of the crop. It was further said in the discussion alluded to, that woody fibre contains no nutriment, that nothing but worms can live on it. The fact that worms and grubs do live and get fat on wood might seem to admonish us that it does contain nutriment. Our corn stalks here were cut rather green, and our little Wolverine children are frequently seen sucking the sacharine matter out of them. Our pigs, though in good condition, do the same. Feed is plenty here; meal and buckwheat flour can be bought for a cent a pound, and beef and pork four cents per pound. But molasses is fifty to sixty-two cents per gallon, and sugar in proportion, and so the children extract it from the corn stalks, which are said to be unfit for food for stock. It is true that very ripe stalks,

or straw or hay, contain less nutriment than when cut green; yet all contain some nutriment, if well preserved. Much depends on the particular objects in feeding. If we wish to make a very large or fat animal in the shortest time, he should have the best of stabling and best of feed. But this, in all circumstances, will not pay. The Hon. Judge Spence, of Maryland, used to ride through his circuit with a pair of very small horses. He said that their progenitors were good sized blood horses; but when they were one year old he placed them on an island in Chesapeake Bay, and kept them there two years without any food or shelter, except what nature provided. This might have been salt marsh and sedge and brush. He said that they were very fleet, very hardy, and easily kept. The wild Indian turns his ponies into the thicket in time of deep snows, and some of them come out in very good condition. We do not advise the provident farmer to imitate him in every case. A finer feed and good stabling is no doubt the better way in general, but circumstances alter cases. The horses of Judge Spence might not be highly esteemed by a New-York drayman, but they answered his purpose better than some of the pampered teams of the city. The first settlers in timbered lands frequently winter their cattle on tree tops. The buds and bark may form more nutriment than the wood, yet altogether very good food for cattle in time of scarcity has been often obtained from forest trees."

Upon this, Mr. Robinson said, that so far as he was concerned, he had never intended to advance the idea that corn cobs or corn stalks, or other woody fibrous food might not be beneficial to cattle, in which term he included all kinds of stock, but that grinding cobs and cutting coarse, dry butts of corn stalks, for feed, won't pay; and it even depends upon circumstances whether cutting straw and hay will pay; but it does not depend upon any circumstance, because it is a certain fact that an animal may be induced to eat such undue quantities of cut stalks and straw, by coating them with meal and seasoning with salt, as to prove injurious. It would require some very nice experiments to prove when and where chaffing stalks and straw, as well as grinding corn, will pay. Certainly not where it is worth only fifteen cents a bushel.

Dr. Waterbury—I am interested in this question because it was I that took the ground that lignin is not digestible; but I did not contend that it may not be taken into the stomach of cattle with impunity. I can, and will, at a future meeting, show pieces of the coarse silex-coated butts of corn stalks that were taken from the intestines of cattle, several months after they were swallowed. The fact is that that part of a corn stalk that is indigestible in its whole state will continue indigestible after it is cut, however we may disguise or sugar it over to tempt the animal to swallow it.

Wm. Lawton—In reference to feeding out hay, I have proved that a bushel of cut hay weighs five and a half pounds, if well pressed down, and that fed to a cow three times a day, I find amply sufficient, and the cows thrive upon it. That is my present practice.

The President—A cow will eat wet hay ten times faster than dry hay, and so will an animal eat moistened cut feed mixed with meal, and it may be owing to swallowing with too much rapidity, that a portion of it passes downward undigested.

CELERY—HOW TO GROW IT.

Solon Robinson—I have a letter from S. W. Paine, Johnson Creek, N. Y., which, although unlike the preceding one that gives us some important information how to grow potatoes, is equally important, because it asks how to grow a valuable plant; and it is only by asking questions that answers are to be obtained. Mr. Paine wants to know how to grow celery, and so do I and some thousands of others, and perhaps there may be somebody here who thinks it such a simple operation that he has never thought it worth while to tell others, who will see by this letter that somebody else wants to know. The writer says:

"I most desire to know how to make a bed for an acre or more of celery, which will keep out or prevent the destructiveness of the gnat, fly, or worm, which destroys the young plant wholesale and retail. I suppose that they arise from the fermentation of the manure; if so, then what mixture will keep them away? Is there anything which will serve or take the place of manure—such as guano, bone dust, &c.? What will prevent or stop the

rust or blast? How can it be preserved for winter use? Any part or all information will be of value to many country gardeners."

Mr. Paine thinks a perfect remedy would be worth $25 to him, and he thinks as much each to many other persons.

Mr. Pardee—I tried, one year, seven sorts of celery, and found Cole's superb celery the best of all; it grows small, and of a pink color, but it is very superior. The seed is now common; it originated in England. Seymour's new solid celery is white, and also a very excellent sort.

Mr. Gore, of New Jersey—My mode of raising celery is this: I dig a trench twelve or fourteen inches deep to set the plants in, and always manure with guano or phosphate. I set a board upon each side of the row, so that no dirt can get into the heart of the plant when I commence earthing up, and keep them there until I get my trench filled as high as the surface of the ground. The soil is a sandy loam. I am very successful, and produce it very fine. I cover the plants with boards in winter, and dig out from one eud of the row as I want it. It should be carefully earthed up every day. The most essential thing in raising celery is to blanch it well.

Andrew Fuller, of Brooklyn—Seymour's celery is the best of all that I have ever grown, as well for my own eating as for sale as a market gardener. I have raised a good deal of celery in various places—the best on rich mucky land, near Milwaukee. I prefer guano for manure.

T. W. Field—The manure mostly in use among the market gardeners, is well decomposed, composted manure and guano.

Wm. Lawton—I am glad that this subject has been introduced, since the proper cultivation of celery is a very important branch of business. I notice the gardeners about here do not use boards, but they are very careful about earthing up the plants every day when they are dry.

Mr. Meigs—I have raised celery with success forty years. The plant loves shade, and must have it when young. I choose such a situation as will be shaded at mid-day, as the north side of a building, or in the shade of a tree, for the best location for a celery plant bed.

Dr. Wellington—The uniform custom here is to sell three celery plants together, at about the same price that one brings at Boston, and yet the Boston celery is the best at three times the price. It grows there far superior to what it does in this vicinity, and it grows best upon peat muck. It is only necessary to shade the nursling plants of celery, and not the after growth.

Prof. Mapes—I have tried a great many experiments in growing celery, and have settled the whitest kinds as the best, and that above all other manures, hair, such as I get from skin-dressers, put in the bottom of the trenches, is the best. The young plants I cut back three times, taking care not to injure the crown, to make the plants strong before they are transplanted. I prefer to have celery beds upon an inclination where I can run water between the rows, and I have tried sundry things in solution as fertilizers, but never found anything equal to hair, though old exfoliated horns do pretty well. Decomposed muck, mixed with sand, makes an excellent soil for celery.

The subject of the day, viz: "The Propagation of Fish," being called up, the President, Mr. R. L. Pell, read the following paper on the habits of fish:

Fishes are vertebrate oviparous creatures, having a heart consisting of one ventricle and one auricle. They are capable of breathing water, their air bladders performing the duties of lungs, and the gills of respiration. The water taken in at the mouth, instead of entering the stomach, passes through the gill apertures and escapes, leaving behind the air contained in it, to act upon the blood. Fish are of about the same specific gravity as the element in which they live, but by means of their bladders, which they can dilate or contract at will, they vary their gravity, and descend or rise with the same ease that a bird does by expanding or contracting its wings, and are able to pass through the water with great rapidity, using as propellers members called pectoral, ventral, dorsal, anal and caudal fins. The bodies of a large proportion of fish are covered with scales, and their teeth are the organs of prehension.

I have eight ponds on my farm, all artificial, and fed by springs; they are, with two exceptions, fourteen feet deep, and contain

forty-five varieties of fresh and salt water fish: a portion of which together with their habits, I intend to describe, and will commence with that most highly prized by sportsmen, the Trout.

The Trout (*Salmo Fario*) is the only fish that comes in and goes out of season with the deer; he grows rapidly, and dies early after reaching his full growth. The female spawns in October, at a different time from nearly all other fish, after which both male and female are lean, weak, and unwholesome eating, and, if examined closely, will be found covered with a species of clove-shaped insects, which appears to suck their substance from them; and they continue sick until warm weather, when they rub the insects off on the gravel, and immediately grow strong. The female is the best for the table. She may be known by her small head and deep body. Fish are always in season when their heads are so small as to be disproportioned to the size of their body. The trout is less oily and rich than the salmon; the female is much brighter and more beautiful than the male; they swim rapidly, and often leap, like the salmon, to a great height, when ascending streams. When I first stocked my trout-pond, I placed fifteen hundred in it, and was accustomed to feed them with angle-worms, rose bugs, crickets, grasshoppers, &c., which they attacked with great voracity, to the amusement of those looking on. They grew much more rapidly in ponds than in their native streams, from the fact that they are better fed and not compelled to exercise. Trout are the only fish known to me that possess a voice, which is perceived by pressing them, when they emit a murmuring sound, and tremble all over.

The *Carp* (*Cyprinus Carpio*).—Of this delicious fish I have a great abundance; having obtained my original stock from Captain Robinson, of Newburgh, fourteen years since. They breed twice each year, producing about forty thousand each time, and grow to the length of fifteen inches. I have seen them on the banks of Lake Como, in Italy, weighing one hundred and seventy-five pounds. I feed them with bread, and sometimes Indian meal. They come up in great numbers at the ringing of a bell, and will eat out of my hand, and permit me to stir them around without

showing the least fear. They are very tenacious of life, and live a long time out of the water. I have crossed them with the gold fish, or Chinese carp, and produced a great variety of colors. As soon as the ice forms in the fall, they disappear in the mud, and as they are not afterwards seen, probably remain dormant in our cold climate all winter.

In Prussia, Germany and Saxony, carp are cultivated with great attention, and constitute a part of the revenue of the nobility. There is no reason why they might not be made profitable here. Fish are like hens, in one respect, that is, they never deposit all their spawn at one time, but at several periods, weeks often intervening, according to its maturity.

The Gold Fish, (*Cyprinus Auratus*,) *or Golden Carp*—are the most beautiful and interesting fish in my waters, where they are only kept as ornaments, as they are not celebrated for their qualities as food. The extreme elegance of their form and scaly dress, and the agility and grace with which they move through their native element, cause them to be ranked among my most charming pets. They are always the first on hand at the ringing of the bell, and are even more gentle and confiding than the carp. I have noticed, that by a proper diet, I can increase the intensity of their color, change their external characteristics, improve the rotundity of their form, and add much to their size; and, what is more surprising than all, those characters become heriditary in their offspring.

The Sun Fish are known as the American Carp, though they will not intermingle with either of the other varieties, European or Chinese, which they much resemble in habits, with one exception, and that is, they build nests in the gravel to deposit their ova, over which they watch with unceasing vigilance, and cannot be induced to leave even for food; when the other fish are eating bread in their immediate vicinity, they appear to be unconscious of the fact, and chase them if they happen to come too near their sacred charge, showing every indication of extreme anger, by distending their gill covers, elevating their fins, &c.

The Pike, (*Esox Lucius*.)—I have a large pond devoted to this fish, in which they abound to so great an extent, that I might sup-

ply half a dozen families the year round from it. They are the most notoriously voracious fish in our fresh water ponds, and will devour young ducks, geese, rats, serpents and frogs; they have an amazing number of teeth, which they use in a scientific manner. These ferocious fish have become with me as docile as dogs, and will assemble in numbers when the small fry are fed, to seize upon them, which they accomplish in a masterly style. Some naturalists declare, that this fish is of a spontaneous generation, deriving its origin from a weed, known as the pickerel weed, and that pickerel are only found where this weed is known to exist. The fact probably is, that the weed, as well as the pickerel spawn attached to it, are carried from pond to pond by the heron, or some fish hawk, attached accidentally to their legs, or eaten as food and ejected.

I have studied their habits with great interest, and find they retire in pairs, about the first of April, and after swimming together, without touching each other, for a day or so, the female deposits her spawn in shallow places, upon aquatic grass, and the male following, fecundates them with milt, which he deposits over them; after having completed this interesting operation, they pass on, and give themselves no solicitude as to the future result of their labors; but, when the small fry make their appearance, the parents devour them with great *gout* and apparent satisfaction. I have known a pickerel to swallow partially a fish too large for his throat, and to carry it thus in his mouth until the portion swallowed was digested; he will, likewise, eat poisonous substances without injury to himself, having within him some antidote with which to counteract its evil effects. They never swim in schools, as many other fish do, but keep aloof from each other, and like to be solitary and alone; they are not easily alarmed, and will never run from a shadow, as most fish invariably will; they often stand unmoved until I put my hand in the water, and will then dart at it boldly, if in want of food. Their bite is almost as venomous as that of a serpent, and very difficult to cure. Pickerel are particularly fond of frogs as food, but the frog always makes battle when the pickerel approach, and will sometimes mount upon his head, where they become very troublesome customers, placing

their fore claws in the corner of each eye, and clinging with their hind legs. If this position is well taken, it is utterly impossible for the pickerel to disencumber himself, until the frog is willing to depart, which he usually consents to do when the fish approaches near enough to the shore to permit him to leap upon it. Pickerel grow faster than other fish in my ponds, making eight inches the first year, ten the second, fourteen the third, and twenty the fourth. I am convinced that an acre pond, well stocked with pickerel, would yield more profit than a ten acre lot under ordinary cultivation. They are remarkably tenacious of life, and live a long time after being taken from the water, and will snap at any object presented. It attains a great age and immense size if unmolested and well fed.

The Yellow Perch, (*Perca Flavescens*,) is a bold fish of prey, and like the pickerel, has a large mouth, well filled with teeth, a hog back, armed with two strong, sharp fins, which makes him a formidable prey for other fish. His outer covering consists of hard, thick scales. Like the pickerel, he will eat his own progeny. As food, he is considered more wholesome than any other fish. His growth is slow, and he breeds but once a year. I have noticed one remarkable peculiarity connected with this fish, and that is, that if a dozen are found in a hole, they will all bite, one after the other, and allow themselves to be caught; being, like most men, unwilling to receive the experience of their companions. They are gregarious during nearly the whole year, and grow, under favorable auspices, to a large size and elegant proportions. This fish is universally known throughout Europe and this country, and the remarkable manner in which its eggs have been distributed has led to curious hypotheses. Some suppose them to be of spontaneous birth. Some years since I constructed a pond, but did not put any fish in it, and you may imagine my surprise when I found therein perch, sun-fish, eels, bullheads, shiners, trout and sea-bass, without my agency, and all within two years. Whence did they come? Birds were the undoubted agents, and it is to them Lake Erie is indebted for the herring, striped rock and white sea-bass, and other fine fish. They have distributed the eel throughout the known world, and frequently carry

them alive, as it is well known that the gastric juice of birds is not sufficiently strong to destroy the life of this serpent fish.

I have known perch to die in my pond from the bursting of their sound or air bladders, caused by loitering in shallow water for prey during an intensely hot day in August, and have, in some instances, saved their lives, when the bladder protruded from their mouths, by plunging them into cold water, the effect of which was a sudden condensation of the air.

The Striped Bass, (*Perca Labrax*,) is a sea fish, chiefly found near the mouths of rivers and arms of the sea, where they remain more constantly than any other ocean fish. They are readily known from the fact, that they have eight parallel lines on the sides, like narrow tape; the scales are very large and lustrous, resembling metal; the eyes are white, head long, and under jaw projects beyond the upper; it is, without doubt, the most beautiful of all our native fishes. I have been enabled, after many fruitless attempts, to breed this magnificent fish in fresh water, where they have now become abundant. He is a bold biting fish, except in winter, when he becomes very abstemious, and will only bite in the middle of the day, when the weather is moderate, and continues to take the hook until the mulberry tree blossoms. The day before you intend to fish on bass, sink a glass bottle in the vicinity of their haunts, with small fish in it, covered with a piece of pierced parchment or linen cloth; this will attract them in large numbers, and by dropping your line in its vicinity, baited with similar small fish, you may take many of them. They spawn throughout March; the female, followed by the male, opens a furrow in the gravel, and deposits her spawn; the male follows, ejecting milt upon it, and at the same time covers the furrow with his tail. This operation is performed with great rapidity, and in the most scientific manner possible, so much so that no trace of the fish is left behind to indicate that the gravel has been moved. This may justly challenge the admiration of all beholders.

The Shad (*Clupea alosa.*) The most interesting of all fish to me is the common *Shad*, which may be regarded as a source of commercial wealth and national industry, and a miracle of nature, in its multiplication and continuance. Notwithstanding thousands of

myriads are destroyed by the agency of man, and tens of thousands of myriads in the ova state, we find an undiminished abundance year after year, which can only be accounted for by their extraordinary creative ability. They spawn about forty-five thousand. They have a peculiarly sloping head and tapering body, projecting under jaw, sharp, small teeth, forked tail, dusky blue color, with a line of dark round spots on each side, sometimes four and often ten in number, and I have frequently seen them without any. They ascend our rivers from the first of April to the tenth of June, for the purpose of spawning, which they accomplish in the same manner that bass do, except that the male fails to cover the ova; this necessary operation is performed by the ebbing and flowing tide. The organization of this fish enables it to breathe either salt or fresh water; and, taking advantage of this fact, I have been enabled to breed them in ponds, and from numerous experiments am led to believe, that shad live but a single year; and that when they pass down our rivers, after spawning, they are so weak and emaciated that they fall an easy prey to voracious fish. They grow in a single season to weigh from five to eight pounds; they appear, as well as the herring, to have been created to form the food of the myriad inhabitants of the ocean. They take, like the herring, (of which they are erroneously called by fishermen the mother,) the circuit of the sea, commencing in the regions of the north pole, in schools, equaling in extent the whole of Great Britain and France. When they reach the coast of Georgia, they separate into immense squadrons, and as the season advances, run up all the rivers on our coast, followed a little later by the herring. Late writers question the migratory character of these fish, and suppose that they remain throughout the winter in the most profound depths of the ocean, burrowing in the mud. This is bad philosophy, as they are not organized for living in mud, and the structure of their air bladders prevents them from sinking in deep water. Their form indicates clearly that they were designed by nature to swim near the surface of the sea, and to be always in motion. I have had herring in my pond, with shad, several hundred at a time, and never saw them at rest.

The shad lives upon suction, and feeds upon the animalculæ in the water, while swimming. Food has never been discovered in the body of shad when opened, and they never bite a bated hook.

I have frequently noticed a fish in the North river, between the shad and the herring—smaller than the shad, but larger than the herring—possessing the general characteristics of both; it ascends the river at the same time to spawn, and returns to the ocean after having deposited its ova.

The Sturgeon (*Accipenser*).—This remarkable fish much resembles the shark, and is covered with bony prominences, ranged in longitudinal rows, the nostrils and eyes are on the side of the head, the snout projecting, body long and slender, mouth small and devoid of teeth; it is an amazingly strong and vigorous fish, and continues to grow until it reaches twenty feet in length; it is mild and inoffensive, and feeds on worms and animalculæ; its bones are entirely cartilaginous; its flesh is much esteemed by many—it is delicate, the color of salmon, and when properly cooked nearly resembles veal; it was in high repute among the Romans and Greeks, and was brought to the table with great pomp, ornamented with flowers and accompanied with music. Caviare is prepared from the roe, and used as an article of food during the Lenten season of the Greek church. Under the mouth there hang pendent four cini, which so much resembles worms that frogs, and occasionally small fish, nibble at them, and are at once seized and swallowed. The tail is its propelling instrument, with which it operates upon the water precisely like an oar when sculling a boat. The other fins are called into requisition in balancing, turning round, and stopping suddenly; the fin on the back, near the tail, performs the interesting office of keel, which is placed underneath on boats. Were it so placed on the sturgeon, he could not feed on the bottom, and might ground in shoal water. The gills of this fish fulfil the office of lungs; their fringes are so constructed as to subject the venous blood to the action of the water, which is driven through them forcibly by the motion of the jaws. I once closed the gill covers, and death ensued in a very short time by suffocation; and on another occasion fastened them open, in such a manner that the mouth could not exert a pressure to react on the water, and death ensued immediately.

The mouth of the sturgeon is a complete force-pump, and is constantly employed driving water through the fringes of the gills with great force. The mouth of the lizzard, frog and toad may be called a bellows, by means of which the animal forces air into its lungs, which are composed of long, narrow cylinders, extending from one end of their bodies to the other; they may be killed in a few minutes by fastening their mouths open, when they die for want of air. All animals that breathe atmospheric air have two hearts, united, called a double heart, one of which throws all the blood into the lungs, and the other forces it through all the arteries in the body; both are force-pumps, and both have valves. Fish are cold-blooded, and have but one heart of the gills, which answers the same purpose as the heart of the lungs in animals. Whales are warm-blooded, breathe air, and are, therefore, supplied with a heart and lungs, but no gills; consequently, a whale is not a fish. A fish cannot breathe air or water alone; they must be mixed, and therefor it would seem to follow that a fish is not an animal.

The digestive apparatus of the sturgeon is simple and complete, and is capable of secreting gastric juice very rapidly, and in great abundance. To prove this, I killed one five hours after he had swallowed a frog, but there was nothing remaining of it in his stomach except two small bones.

Surprise has been expressed by gentlemen, that I could fresh-waterize salt-water fish. Now, the fact probaby is that all fish were originally salt-water fish, and inhabitants of the ocean; but the Deity having implanted in them habits of wandering, they have been gradually dispersed thoughout all the waters tributary to the great ocean, and carried by birds to every pond, lake and pool on the face of the earth, which teemed with countless thousands of organized insects, eternally propagating their species to supply them with food. Man, animals and fish can, at all times, change their residence, and soon become acclimated to any locality.

The Salmon (*Salmo Salar*).—The upper part of the female is somewhat larger than the under, and in the male fish the under jaw curves up, so that the sexes may be easily distinguished by this

peculiarity; there is a shade of blue on the back of both fish, with silver sides, containing dark spots of an irregular form; the teeth are on the tongue; and the scales are all striated. The Connecticut river was once famous for this magnificent fish; they traversed it to its highest branches, overcoming waterfalls and cataracts with the greatest imaginable ease, and after depositing their ova, returned to the ocean, thin and emaciated; they have decreased in the same ratio that men have increased, and have now become extinct. When they enter fresh water, they are covered by an insect called salmon louse, which dies after the third day. They are then infested with fresh-water worms, which die on their return to sea. Salmon cannot be caught by any person wearing a red shirt or cap, as they have a very great antipathy to that color, and when alarmed will swim at the rate of thirty-two miles an hour. It has been undeniably proved by many successful experiments that they invariably return to the streams in which they were born, to deposit their spawn, and when they go back to the sea their haunts are unknown.

Their spawning ground invariably has a gravelly bottom. On reaching it they pair off, and together make their spawning bed, which is often eleven feet long and nine feet wide. The female forms a furrow, by by working up stream, in which she deposits her ova, the male follows and ejects his milt upon them, and covers them with his tail; they are frequently engaged ten days in this occupation, after which the male fish directs his course towards the ocean, followed ten days later by the female, she having spent the intermediate time in the deep parts of the river, apparently for the purpose of rest. At the expiration of ninety days the fry are hatched, and have attached to each individual a small sack containing the yolk; this is gradually taken into the stomach by the natural absorbing function of the navel, and is the only food they require for some time. The same wonderful provision is made in the eggs of birds. On killing and dissecting a chicken, half an hour after it was hatched, I found the yolk perfect and unbroken, the only difference was, that instead of being within a shell, it was within the chicken, ready formed to supply the necessities of life, as fast as the system required them. This

is the reason, as I have often explained to farmers' wives, why young chickens do not desire food until some hours have elapsed after their birth; thousands of young chickens are annually destroyed by poultry-raisers, who make them eat too soon, and thus counteract this wonderful provision of God.

At different periods of their growth, salmon-fry are known by different names—when one year old they are called penk; when they go to sea at two years old, smelt; and after their return to fresh water, salmon. They live about ten years. I think I can discover the age of any fish at any time within six years, and also the age of oysters. Food is rarely found in the stomachs of salmon when caught, from the fact that fright causes them to disgorge the contents before they are safely landed.

Salmon-fry will weigh, when five months old, four pounds; ten months, eight pounds; sixteen months, fifteen pounds; showing that fish attain their growth far more rapidly than terrestrial animals. The brain-bones of the salmon are peculiar—they are concave on one side, and convex on the other, with serrated edges, highly enameled, equal, in fact, to the human tooth; comparative anatomists consider them a part of the organ of hearing, but I really do not.

There is, in all probability, nearly if not quite as much nourishment in salmon as there is in beef, weight for weight; and when you take into consideration its soft and flexible fibre, you would naturally suppose that it was more digestible. If you visit our fisheries, you will find robust, hale and hearty men, with handsome, healthy women for their wives, and large families of children, entirely free from tubercular and scrofulous diseases, which may, in my opinion, be attributed to the fact that the flesh of fish contains iodine, a substance never found in the flesh of animals, or the food they eat. Iodine belongs to the electro-negative supporters of combustion, and is an irritant poison, but administered through the medium of fish, it will be found of great service in many forms of glandular disease.

The Eel (*Muræna Anguilla*).—In one of my ponds I placed a stock of three thousand eels, weighing from six ounces to two pounds each, and endeavored to study their habits. During the

day they partially conceal themselves under stones, stumps and mud, exposing the head only to view; and in this manner they watch for their prey. They delight particularly in still, muddy water; and notwithstanding naturalists have decided that they are viviparous, and that lumps of little eels have been found in them, the size of a fine sewing needle, I have come to the conclusion that it is a mistake, and arose from the fact that eels are often infested with small worms, which have been taken for small eels. They are undoubtedly oviparous, and go to brackish water to deposit their ova. I found in the fall my eels all left the pond, not one remaining to breed in it, and many returned the following spring of all sizes. I then stocked the pond again, and in the fall placed fine salt in it: the eels then remained, deposited their ova in the pond, which in due time hatched there, and produced a great quantity of young eels. I am convinced, though I have never seen either spawn or milt in eels, that they have all the necessary parts of generation, as well as other fish; they are very tenacious of life. I have known them to live five days in a grass meadow, and when returned to the water, swim with their usual rapidity. I have placed them one hundred yards from the pond, and found that they would invariably turn towards the water and make their way to the nearest point, evincing a strong migratory instinct. Eels are supposed to be spread over the world more universally than any other animal except man, but none are seen in situations where they cannot get to salt water. For example, they are not found in Lake Erie, above the falls of Niagara. Eels were never seen above the falls in Paterson, until the canal was cut; ever since that period they have been found in immense quantities and of exquisite quality. They are nothing more nor less than water-serpents, and may by called the connecting link between amphibious and aquatic reptiles. They have been caught in New-York harbor weighing thirteen pounds. As an article of food they are extremely nutritious and rich, but contain a large quantity of oil, and unless eaten with an acid, are apt to occasion derangements of the digestive organs. Eels are covered with a mucous substance, which makes them difficult to hold, and has led to the notion that they are devoid of scales. This is an error, as I have discovered them readily with a magnifying glass.

The Bull Head (*Cottus Virginianus*), is universally known over the whole continent, being adapted to all latitudes. It is a disgusting looking fish, having an olive colored body, with a black back. The head is out of proportion to the rest of the body, and has a long, sickle-shaped spine on each side of it. They seldom exceed twelve inches in length. The habit of this fish, when about to deposit its ova, is to build a regular nest in the mud, which it carefully lines with aquatic grass; in this the female deposits her eggs, which in due time hatch, and are protected with great care and apparent anxiety by both male and female, until large enough to look out for themselves. These nests may be found all along the shores of the Hudson river. When taken from the water it grunts, by inflating the gills and muscles of the mouth.

The Sucker (*Cyprinus Teres.*)—This is a still, dingy-colored, lazy fish, and is particularly fond of basking in the sun, with its head towards the inlet, holding on by suction to some stone or root. Its mouth is shaped much like that of the sturgeon—the eyes are very large and without eyelids. Suckers sometimes grow sixteen inches in length in my ponds, and weigh one and a half pounds, but their flesh is not much prized as food. I have examined this fish thoroughly, and find his organs have not the least connection with those of respiration, his olfactory nerves are very large, and have, on that account, been taken for his brain, and he has no external ear; he has three winding tubes in his head, which terminate in a bag filled with nervous marrow, containing three hard bones—this constitutes the whole organ of hearing—and the organ of taste is more imperfect still; the tongue has not even the papillæ, and the nerves branch off to the gills; the motion of the heart is far more independent of the spinal marrow and brain than in the higher orders of animals, and possesses motion for a very long time after the brain is destroyed.

These remarks apply to nearly all fish—at least I have not found an exception in my examination. The first impulse in swimming comes from the tail, which, with its fin, serves as a rudder, to give direction to the motions of the fish, and the other fins regulate the position, and guide him through his native element. Fish smell the bait much further than they can see it, and I have no doubt, from experiments that have been tried in

my ponds, that their sense of smell is exceedingly acute, and their hearing sufficiently developed to be perfectly susceptible of all simple sounds, having the same acoustic apparatus that is found in the centre of an animal's ear, but being enclosed in the bones of the skull in such a manner that the vibratory motion in water of sound comes in contact with the auditory nerve, and thus produces the sensation of hearing. The eye of the sucker, and many other fishes, is globular, with a flat cornea, and is consequently not extended as far into the field of vision as the eyes of terrestrial animals, which require an extraneous aqueous humor to keep the eye convex; fish do not, because the element in which they live is equivalent, and keeps the outer tunics always moist. Therefore, there being no tears for lubricating purposes, I have never found a lachrymal sac. There is a wonderful contrivance of nature in the constitution of voracious salt water fishes' eyes, enabling them to bear against the pressure of water at great depths in the ocean, consisting of a hard bone with an opening into it for the optic nerve. Fish that inhabit shoal water possess a membraneous eye, and if forced into deep water they would immediately become blind—consequently you can judge accurately how deep any species of fish are enabled to swim. Fish having no eyelids, must necessarily sleep with their eyes wide open, and are probably always enabled to see when danger is at hand; they see to a very great distance in clear water, but turbid water renders their vision indistinct. The whale can distinguish a boat nearly two miles off. I have noticed on removing the sucker from water, that the light at first appears to paralyze the optic nerve, but soon thereafter the pupil diminishes in size, and the fish probably sees as well as a person would with his eyes immersed in water. On replacing him in his proper element, he appears to be confused, and swims against any object that may be opposite to him. This experiment I have often tried, and never knew it to fail. The sucker is acutely sensible to the touch of the human hand, and his sense of smelling enables him to detect food, or enemies, at a very great distance. I have placed food with the oil of rhodium on it, at one end of a large pond, and have noticed the sucker, accompanied by the carp, perch and shiner, at the other end, immediately turn and swim to it. I

have then placed a dog in the water at one end, and observed great uneasiness among the fish at the other end. Taste is probably the most weak of their senses, as they appear to swallow all sorts of food with avidity. Still their flavor is influenced to a great degree by the nature and quality of their food, and this is the reason why the same fish vary so much in flavor on different coasts. A few fish improve in firmness and flavor as they advance in years, but generally speaking they grow coarse. Fish are invariably in the best condition for the table while full of ova. After depositing their spawn they grow thin, and become unwholesome; the muscles appear bluish and transparent, owing to the extraordinary muscular exhaustion which they necessarily undergo during that interesting season. Fish surpass in fecundity all other animals; there have been counted in the sturgeon one million six hundred thousand ova; in the mackerel, one hundred and twenty-nine thousand; in the carp, one hundred and sixty-eight thousand; in the pike, one hundred and sixty-seven thousand.

The Herring (*Clupea Harengus*).—I have not been so successful with this remarkable fish as with many others. They die the moment they are taken from the water. The head and mouth are compressed, the jaws unequal and short, the tongue rough and short, teeth inverted, and gill covers contain generally four plates. He is of an ash color on the back, and his sides are white and silvery. This family of fish, as far as numbers are concerned, exceeds all the rest of the fish in the ocean put together. They penetrate to the Polar sea, inaccessible on many accounts to voracious fish, and there breed and multiply beyond the computation of man. It was supposed by Pennant, that if two herrings were allowed to live, and increase in their characteristic style, and the lives of their offspring spared for twenty-five years, their bodies united would exceed the bulk of the world ten times. An army of them, equaling in extent Italy, France and Spain, leave the regions of the Pole in the spring. Early in June they surround the Shetland Islands; next Scotland, Ireland and England; they then cross the Atlantic to the coast of Georgia, from thence they move east, and line the entire sea coast of North America, more than three thousand miles in extent; and what is most remarka-

ble, they always keep the same distance from the sun, and never rest, and are always compelled to remain near the surface of the sea, as their air-bladder is too fully developed and their fins too broad to permit them to sink deep. We can scarcely conceal our amazement at the number of these fish, when we take into consideration the thousands of millions that are yearly taken throughout the world by fishermen, the tens of thousands of millions destroyed by whales, and other marine monsters, that follow them night and day throughout all their migrations. In Holland, many years since, one hundred and sixty thousand persons were engaged solely in taking them. In Yarmouth, England, sixty-two thousand barrels are caught and cured annually. Eighty-three years ago, four hundred and thirty thousand barrels were exported from Norway, and seventy thousand barrels of herring oil from Sweden; and yet, notwithstanding the untiring activity of these numerous destructive causes, every ensuing year finds the abundance undiminished, and perfectly inexhaustible, defying the combined arts of men and the irrepressible voracity of all the ocean tribes.

The common Cod (Gadus Morrhua.)—I have failed to accomplish any good result with this fish in fresh water, as yet; still I propose to continue the experiments until success attends my efforts.

The cod is covered with loose, soft scales, and has soft ventral fins; the air bladder is large, and teeth are arranged in unequal rows. He is confined to cold climates, and found in prodigious numbers in the northern parts of the globe, principally between the latitudes of forty-five and sixty-six; those taken north or south of these latitudes are inferior in quality and size. They are never seen in the Mediterranean. The banks of Newfoundland, Nova Scotia and New England abound with them; they are also taken on the south and west coasts of Iceland, Norway, in the Baltic, and off Scotland. They spawn on rocky ground, and recover after it sooner than any known fish. The flesh of the cod is white, rich, firm, and extremely nutritious. He possesses the power of compressing his air bladder, and thus condensing the air to such a degree that his specific gravity becomes much heavier than water, and he sinks rapidly; when he desires to rise,

he relaxes the muscles connected with his bladder, causing the air within to be expanded, when he immediately becomes specifically more light than the water, and ascends. The flounder, sole, eel and numerous other fish have no bladders, and are therefore compelled to remain always on the bottom. The cod is gregarious, and traverses the ocean in immense squadrons, remaining in certain localities as long as they yield appropriate food in sufficient abundance to supply his wants; he is particularly fond of certain marine plants, muscles, sand-worms and snails. The cod can never be caught by the flesh of his own species cut up for bait, as many fish can. If stale bait is used, he smells it at once, and flees from it rapidly. This fish is regarded very justly as a source of commercial wealth and national industry, as well as a wonder of nature in its continuance to multiply as it does, notwithstanding the myriads that are destroyed by the agency of man, also in the egg shape by ravenous fishes, and even by their own gluttonous parents, clearly demonstrating that without extraordinary creative power the species could not be protracted long. But nature has endowed this race of fish with the most remarkable fecundity, as careful and oft repeated observation has shown that the ovaries of each full grown cod contain, on an average, nine million three hundred and forty-four thousand ova.

Their flesh is composed of firm, white, flakey muscles, and forms a wholesome diet, either fresh, salted or dried; the tongues and bladders, salted or pickled, are considered a delicacy by epicures; the liver is delicious, and affords a limpid oil, now well known to commerce; the head is principally composed of gelatine, and is considered the most nutritive portion of the fish, and would furnish a large percentage of isinglass, or glue, if properly prepared; the intestines are eaten by the French, and considered a luxury, and the roes, when pickled, are exceedingly fine.

Before the American Revolution, there were employed in the Massachusetts cod fishery nearly thirty thousand tons of shipping, and more than four thousand seamen; the value of their industry annually, was about eleven hundred thousand dollars. It is an interesting fact, well established, that our unsurpassed system of common schools took its rise in the Plymouth fisheries in 1662 or

'63, when the colony court passed a law that all the profits annually accruing to the colony for fishing with seines, nets, &c., should be devoted towards founding a school for the training of youth, and it was established at once, and supported by the proceeds.

The Mackerel, (*Scomber Scomber*.)—This fish is well known to be, in form, one of the most beautiful among the finny tribe; its colors, when fresh from the sea, are truly splendid. It is supposed, like the herring, to be migratory; spending the winter in the northern seas, and visiting the south to deposit its spawn. There are twenty-two species of this fish; the one best known in commerce has a smooth, compressed head, and several spurious fins between the caudal and dorsal fin, and is generally twelve inches long; they have transverse dark blue stripes, richly shaded with a tinge of green, extending from the dorsal fin. The males have black spots on the sides, fading into a yellowish green, that artists find great difficulty in imitating. Among edible fishes, the mackerel has, from the remotest antiquity, maintained a very high rank. It is said, that a Roman consul once paid for a single one, when out of season, $216.

Their greatest enemy is a fish known as the Tunny, (*Scomber Thynnus*,) which follows and devours them voraciously. "Pliny, the naturalist, gives an account of a shoal of tunnies, following a school of mackerel, so vast, that the fleet of Alexander the Great could not maintain its course through them, until the ships were arranged in battle array, to force the extraordinary aquatic phalanx to give way to the conqueror of the world." They are so prolific, that 550,000 ova have been counted in one female. They are voracious feeders, and live on the small fry of other fish. They are in great request as food, but are only in perfection when full of spawn and perfectly fresh. No fish spoil more rapidly than they; in consequence of their being so perishable, the authorities in London permit them to be cried through the streets on Sunday.

I expect to have the following curious fish in my ponds within the next six months:

The Tench (*Cyprinus Tinca*) is known as the physician of fish; he is covered by a glutinous slime, that will immediately heal

any wounded fish coming in contact with him; it has often been observed that the tyrant pike, though starving, forbears to devour the tench. He has large fins, small, smooth scales, a red circle surrounding the eyes, which are of a golden color, and there hangs from either angle of his mouth a little barb; in his head are two stones that physicians make use of, but have not communicated for what purpose. They are generally found in large stagnant waters, with muddy bottoms; weigh from eight to twelve pounds, and are considered in England one of their best fresh water fish.

The Embiotaca, a viviparous fish, known in California, that have slightly attached to the back bone a long, light, clear and transparent violet bag, in which are found an immense number of minute fish, resembling the mother in color when born; they are perfectly adapted to gain their own living in the water.

The Crawfish, (*Astici*,) found in the Little Genesee river, are migratory in their habits, and exceedingly destructive. When swimming up any stream, if they come in contact with a dam too high to pass over, they undermine it, by burrowing under the bottom planks, and are capable of removing many bushels of earth in a night. On account of their depredations, the owners of the immense dam in that river have been once compelled, it is said, to rebuild it. The crawfish found in the Mammoth Cave, Kentucky, have the rudiments of eyes, but no cornea or optic nerve; darkness having destroyed the sense of sight. I think I can so graduate the light, when I get them, as to change the rudiments of eyes into sight-seeing eyes of their progeny.

The Carribi.—This is a small and exceedingly voracious fish, found in Venezuela. It resembles the golden carp in the brilliant orange hue of its scales; they are four inches long, and have a large mouth, which opens in the same manner as a bullet mold, and is well filled with broad, sharp teeth, similar to a shark. Whenever they bite they take away a piece of flesh. They will attack a man, or animal, and strip the limb of flesh in a very few minutes. The taste of blood spreading in the water, attracts them in myriads.

From experiments that I have tried in the artificial breeding of fish, I am convinced that the ova of all varieties may be carried,

after impregnation, three or four thousand miles, in water occasionally ærated, and planted as successfully as if deposited by the parent fish. For this purpose, form a hollow spot adjoining a clear and rapid stream of water, say twenty feet long and eight feet wide; fill this space with coarse gravel to the depth of six inches, and on this foundation place fine gravel and coarse sand to the depth of six inches more, plant your ova one and a half inches deep, in furrows, and cover them so that the whole space presents an even surface, then let in the water to the depth of seven inches at the upper end, and six at the lower, forming a uniform gentle current over the whole space; the sluice must be so regulated as to keep up the same supply and depth of water at all times. In this way millions of fish may be bred, protected to the proper age, and then turned into the rivers or ponds to grow and increase. Last summer I impregnated the ova of shad, and planted them in a ditch a quarter of a mile in length, extending from one pond to another, in the most careless manner possible, not even taking the trouble to cover them, and they produced tens of thousands of young shad, which I use as food for my pickerel and perch.

A breeding pond should have grass around the sides, and occasional gravel beds rising to within two inches of the surface, for the fish to spawn upon; two females and one male will stock an acre pond in two years; and in three years it will be necessary to put in a few male perch or pickerel to thin them out. If eels and bullheads get in your pond, as they inevitably will in a short time, saturate the water with quick lime, and in a few hours the fish will all die and come to the surface, when they may be used as manure, and will produce, on account of their rich, oily nature, the most luxuriant effect on land.

Fishes, in natural history, form the fourth class in the Linnæan system; their proper division is into fresh and salt water fish. A very few species ascend rivers to deposit their ova. We know something about four hundred varieties, and nothing about eight hundred more.

The Hudson River Sea-Horse (*Hippocampus Hudsonius.*) This little creature is about six inches long, having on the top of the head a large protuberance resembling bone, ending in five points; the

nostrils are double, and eyes exceedingly prominent. It has a long, four-sided tail, blunt at the end, and is devoid of fins, with a body entirely made up of segments, protuberant and heptangular; the jaws are straight. When swimming, the hippocampus maintains a perfectly vertical position. It uses its tail to hold on to anything it may find in the water, and thus fixed, it darts at its prey and seldom fails to secure it.

The Mossbonker (*Alosa Menhaden*).—I am endeavoring to breed this bony, hard-headed fish, for manure. The top of his head is green, and sides silvery white; he is immediately recognised by a dark spot on the shoulders, just behind the opercles, and there is a transparent space behind the eyes that you may look through and see any opake substance on the other side. Scales cover the fish in such a manner as to present the appearance of a sheath, and what is more singular still, the fins are enveloped with them. The stomach is covered inside by a verv black substance, and the intestines are convoluted. The meat may be eaten; it is excessively dry, and filled with bones, without possessing the least flavor, and seems intended by the Creator as a manure, for which purpose it is the most valuable fish that swims, and is one of the chief sources of wealth to the inhabitants of Long Island. For corn, they place three or four in a hill; for wheat, cover the field with them and plow them under; for grass, decompose them in the compost heap.

Its value, in my estimation, has a drawback, that leads me to think I never will be able to use it as an enricher, and that is its unhealthy and abominable smell, which may be percieved, if my olfactory nerves are true, the moment you reach the fish district; and I believe it to be the originator of fevers and other diseases that are known to exist in the neighborhood of those using them in the fall of the year.

From the 1st to the 10th of June, shoals covering immense areas appear near the shore of Long Island, with their heads partially above the surface of the water, thus stupidly indicating their whereabouts. One thousand fish are considered a wagon-load, worth about two dollars, and eighty-six wagon-loads have been taken at a single haul of the nets.

The inhabitants of Massachusetts pack and export immense

quantities of them to the West Indies, and likewise use them as bait for halibut and cod. They are known by several names; the Dutch called them Morsebonkers; the Manhattans, Panhagens; the Narragansetts, Menhadens; and the people inhabiting eastern Long Island, Skippangs.

The Black Bass (*Labrax Nigricans*).—This fish found its way to me through the Erie canal, and ran up a creek on my farm to spawn, where it was taken in large numbers and transferred to the ponds, together with many other valuable fish from the Great Lakes. My attention was called to them from the peculiar and extraordinary manner in which they were preparing to deposit the ova and milt in large holes, made by the most strenuous exertions of both male and female, who were so intently occupied with their pleasing occupation as not to heed me, though sitting on the back of a horse that was alternately drinking and pawing the water, within a few feet of them. They deposit their ova in May, and the small-fry are hatched by the first of June, the term of incubation being about twenty-one days, the same as the fowl.

The body is oval, back round, color greenish, bands transverse, stripes oblique, three in number, running from the root of the tail to the eyes, and they grow until twenty inches long, weighing seven or eight pounds. When taken with the hook he becomes perfectly furious, and fights as long as life lasts with determined rage, thus affording fine sport to the fisherman and a delightful morceau for the table.

I caught at the same time another fish closely resembling the black bass, but different, having a mouth three times larger, a larger head and larger scales. In other particulars he might readily have been taken for the same fish; he thrives in artificial waters, but does not mix or associate with the black bass. They spawn in April. The female, unassisted by the male, forms a species of nest in the gravel, in which she deposits her ova; he follows, impregnates and covers them. The flesh of this fish is inferior to the black bass, though firmer; when taken he is very fierce for a minute, then gives up and lies quietly until he dies. Both his jaws are lined with recurved acute teeth, as well as the vomer and palatines. The tongue likewise has a row of teeth on

the centre of it. I have noticed that this fish possesses the remarkable faculty of changing its color at will, and in an inconceivably short space of time. When you come suddenly upon him, you see him plainly; directly he vanishes, and you imagine he has gone; in a few minutes he gradually assumes his color, and you behold him again in the same spot. I do not know what to call this fish, as he cannot be identified with the black bass, differing from him as he does in physical form and habits; yet, when seen side by side in the water, they cannot be distinguished apart.

The White Lake Bass (*Labrax Albidus*), was caught at the same time, and may justly be called a very beautiful fish. Its color is a a bluish white, with dusky narrow parallel streaks beneath the lateral line; the sides and abdomen are silvery white, irises white, pupils intensely black; the caudal and dorsal fins are brown, edged with blue; pectoral fins white, bordered with green; ventral fins blue, tinged with white; weighs about one and three-quarter pounds, and can have but few superiors as an article of diet. This fish is admirably adapted to do well in ponds. It spawns about the middle of May, in gravel; the male opens a trench three inches wide, and one inch deep, by forcing himself through with great vigor and rapidity; he is immediately followed by the female, who deposits her ova, and when she stops to rest he returns behind her, drives off the little fry that always follow to eat the spawn, showing great anger by expanding his tail, opening his gill covers, and raising his fins to their utmost capacity, and occasionally swallows several of them at a time, being a very voracious fish. Having cleared the grounds, he impregnates the ova, and covers them with his tail, by which time the female is ready for a new furrow, and the work progresses. She appears to deposit all her ova in about four hours, commencing usually at 10 o'clock in the morning. He is a great feeder, takes the hook readily, bated with live or dead fish, artificial flies or red flannel.

Dace (*Leuciscus Pulchellus*).—This is one of the most beautiful of the bass family, and an excellent fish for the pan; is particularly satisfied to live in an artificial pond, without inlet or outlet. Being sluggish in his habits, he is unwilling to contend with rapid

running water, and may always be found in some quiet corner, apparently meditating upon the cares and pleasures of life. Being a small and dainty feeder, he appears always satisfied and contented.

His back is variegated, and general color a sea green, with dark brown spots on the lower part of his body, and irregular streaks above; the fins are all edged with spots of brown. This fish is particularly tenacious of life, and will live six hours wrapped up in wet flannel. They spawn about the first of June; the female swims leisurely through the water, dropping her ova, followed closely by the male, who ejects spermatic fluid upon them as they sink; and it is a remarkable fact that the milt always overtakes the eggs before they reach the bottom. Nature never fails to procreate her species.

The Rock Bass (*Centrarchus Æneus*).—This is an admirable table fish, and is well known and appreciated by those living on lakes Erie and Champlain, where it is considered one of the very best game fish, biting freely and fighting to the last; they weigh about one pound each at the age of two years. The body is compressed and short, head entirely free from scales, the preopercle has small scales upon it, and the opercle large ones. I observed when using a strong glass, that their margins were denticulated, and truncated at their bases. There are seven rows of scales above the lateral line, and twelve below it, and they ascend in such a manner upon the fins as to form sheaths for them as in the Scienidœ. The nostrils are twofold and small, lower jaw larger than the upper, teeth small and conical; their stomachs are peculiarly formed, having six cœcal appendages, all of which are generally filled with young fish. The rock bass, when first taken from the water, presents a dark bronze-green appearance, with a bottle-green head and metalic green gill covers. Subquadrate longitudinal brown spots appear below the lateral line; the eyes are large, pupils purple and surrounded by a narrow yellow ring; the ventral fins are edged with blue, and he may be considered a very beautiful fish.

They are now quite abundant in the Hudson river, and often taken by shad seines. They spawn about the 20th of May, on

gravel shores; the female makes a zigzag opening in the gravel, and lays her ova, and as she does so, partially covers them with sand, whether purposely or not, I am unable to determine, and the male makes his deposit on the gravel, instead of upon the ova. It is quite possible that if ejected upon the ova it might be too strong, and destroy them. As I have been enabled to dilute the spermatic fluid of the frog five hundred to one, and found it capable of impregnating the eggs of the female, and forming a perfect tadpole, I have come to the conclusion, after making numerous experiments, that no fish can be induced to eat anything while spawning.

The Muskellunge (*Esox Estor*).–The body of this fish is cylindrical, scales small and thin, covering partially even the cheeks; the head is perfectly smooth, snout broad and depressed, mouth very large, teeth are arranged in the anterior portion of the lower and upper jaw, and acute teeth on the sides of the lower jaw; there are likewise small teeth on the palatines and vomer. The color of the back is quite dark, the sides pale, and covered with yellow spots varying in size, and they not unfrequently become confluent. They inhabit the waters of Lake Huron, Lake Erie and Champlain, where they are caught in seines, and considered an admirable table fish. The male and female copulate and extrude a certain number of ova, and this process is repeated until the ova is disposed of.

The Smelt (*Osmerus eperlanus*) is a very small but most delicious malacopterygious fish, much resembling, in many of its habits, the salmon. It enjoys the salt water, particularly, in the vicinity of the mouths of rivers. Its mouth is filled with long pointed teeth, the eyes are large and body long. They spawn early in April, and then return to the sea. Shoals of young fry are seen leisurely swimming about the harbors from the Hudson river to Labrador, during the early part of August. Fresh smelt may be immediately known, from the fact that they smell precisely like a cucumber when first taken from the water. It is green on the back and silver on the sides; the scales are large, oval and concentrically striate. The head is more than one-fourth of the entire length, smooth and sloping, nostrils large, contiguous and

double. The ovaries present a bright yellow color, and, what is singular, they have no cœcal appendages, which are common in those found in Europe. They are generally from four to six inches long, though individuals have been caught twelve inches in length.

The Stickleback (*Gasterosteus.*)—There are several varieties of these fish in our waters, and all of them more or less voracious. They sometimes use their spines against each other with fatal effect. They inhabit locations filled with rocks and sea weed, in which they construct a regular nest, in the month of April, as a receptacle for their spawn. After having deposited it the male or female is invariably found in its vicinity, and woe be to the fish that has the temerity to approach too near, as their ferocity knows no bounds, and they never lose an opportunity of displaying it. Their nests are seven inches long, and shaped like a pear, and are formed by matting together various algæ. These are tied by a thread which is passed around them in every imaginable direction. It is very long, exceedingly fine, elastic and strong as silk, and supposed to be formed by some albuminous property contained in the fish. Their body is fusiform, containing on the sides about thirty transverse plates, elevated from which, there are several sharp spines. The first is placed above the base of the pectoral; the second above the fourth lateral plate; the third near the dorsal fin.

The Haddock, (*Gadus Æglifinus.*)—I have failed to fresh waterize this well known fish. Like the cod, it is a native of the northern seas, where it congregates together in mighty shoals, and starts at stated seasons to visit certain coasts. It has a robust body, tapers behind, and is large in front; the length of the head to the total length is as four to one; the scales are small, the eyes are placed near the facial outline, and are large. Below the lateral line the color is a silver gray, above, a dark brown; the pupils are black, irides blue, mixed with red. On each side there is a large black spot, which superstition assigns to St. Peter, as the mark made by his finger and thumb when he extracted the tribute money from a fish of this species, which has been continued to the family of haddocks ever since this wonderful miracle was performed. That

the reference to St. Peter is entirely gratuitous, is indicated by the fact, that the haddock has never been found in the waters of the country where the miracle really was performed. Moreover, the Sea of Gallilee is a large sheet of fresh water. This fish is as common as cod in the New-York markets, but far inferior as food. In Massachusetts they are often used as manure. I am led to believe, from several experiments, that the haddock is a viviparous fish, and fully develops the embryos in the ovary, which are probably brought forth in a sack. I think the cod is also viviparous, as well as the hake.

The Pilcharo, (*Clupea Pilchardus.*)—This fish is a species nearly resembling the common herring, and is better known abroad than in this country. The head is flat, mouth destitute of teeth, abdomen and sides silvery, back blue, and on each side of the gill covers there is a black spot. These fish make their appearance on the English coasts in immense shoals about the first of July, disappear in October, and re-appear in December. When a school approaches ths shore to spawn, they are surrounded by a seine, and twelve hundred tons, or four thousand three hundred hogsheads, are often taken at a haul. When landed, they are piled up in cellars, and salted; after remaining about one month in this state, they are cleaned, washed, and packed in large casks, containing nearly three thousand fish each. Pressure is then brought to bear, and three and a half gallons of oil are extracted from each cask. Some of these fisheries produce one hundred millions of fish per annum.

The Buffalo Bony Pike (*Lepisosteus Bison*) is generally confounded with the pickerel, though there is no resemblance between them; their jaws are elongated, and armed with acute, conical teeth, with a second set within them; their backs are dark, and bodies yellowish.

The Climbing Perch, (*Anabas Scandens.*)—This is a genus of fishes, the respiratory organs of which are constructed in such a manner as to fit them to live for a long space of time out of their native element. They have a pharyngeal apparatus with which they keep their gills moist; if on land, some natural instinct guides them to water. They are said to be able to climb trees by means

of their tails, fins, and spines attached to the gill covers; but I doubt it. Still, there are said to be fish that use their fins for feet, and walk or jump on sand. And others of the Barbel species are known to live in a thermal spring, at Constantina, which for more than one hundred and fifty years has maintained 202 degrees Fahrenheit—almost boiling water.

It is a paradoxical fact, that sailors eat fewer fish than any other class of people. The reason is plain; few fish are so constructed as to live permanently at sea, remote from land, where the water is more than three hundred feet in depth; as pressure regulates the general distribution of fishes in the sea. They are chiefly found in the bays, straits, and along the coasts, where their food abounds—with the exception of dolphins and flying fish. *The Dolphin*, (*Delphinus Delphis*) commits great ravages among the enormous shoals of flying fish (*Exocetus Volitans*) inhabiting the temperate latitude; and it is a very remarkable fact, that he necessarily seizes it as it endeavors to escape him, behind; and were it not for provident nature, he could not swallow it, on account of its wings. The moment, however, it enters his mouth, some internal management reverses the fish, and it passes down his throat head first. This cetaceous animal much resembles the porpoise, but has a longer snout and more slender body; it grows to ten feet in length, and is possessed of the most brilliant colors. The back is spangled with rich green spots, the fins and tail are the color of gold, the lustre of which nothing can surpass. They have one young at a time, which is suckled by the mother. They inhabit every ocean from the poles to the equator, and are capable of enduring the two extremes of heat and cold equally well; they respire through the medium of lungs, and come to the surface to breathe, throwing out water from an aperture in the head, precisely like a jet of steam from an engine; this hole is supplied with a valvular apparatus, and opens, if I recollect right, directly above the eyes. I had the pleasure of examining one at sea, and imagined that I had never seen anything more strikingly beautiful. It had several flying fish in its stomach of the oceanic specie, (*exocetus exilieus.*) The one I examined had a large head, large eyes, a silver color combined with gold, large round scales, and a

back beautifully tinged with blue. The pectoral fins extended to the tail; they were lanceolate in form; the lower part of the tail was far larger than the upper, and much forked.

During a recent visit to my farm, I had the good fortune to be able to settle the vexed question which has bothered all the naturalists from the days of Aristotle to the present, respecting eels; whether they were oviparous or viviparous. They are, as I surmised before, oviparous. I found in a specimen examined by a microscope, an immense number of ova, imbedded in a white substance that has always been taken for fat, in the female as in the male. It presents the same white appearance in both. Monsieur Coste, of the College of France, says the manner the eel generates is wholly unknown.

Fish eggs may be fecundated and transported with the greatest ease to very great distances, without fear of failure, particularly the salmon and brook trout, which require from sixty to ninety days to mature. When two black specks are seen through the membraneous cuticle that covers the egg, they may be packed for exportation. The best plan is to place them between wet woolen cloths, about fourteen inches square, and pack in alternate layers in boxes, perforated at the top and bottom, so that the water used to moisten them at stated periods, may pass off, after having saturated them sufficiently.

Another plan is to place the ova on aquatic grass, to which they will adhere, and then fecundate them by gently squeezing the male in such a manner that the milt will flow upon them, after which they may be placed in pure running water for a week or two, according to the variety of fish, after which pack them in a box, as above described, and keep them constantly wet.

If intended to be sent to a great distance, you may place a layer of coarse sand, partially wet, in the bottom of a box four inches in depth; on this lay the prepared eggs separately, and cover them with an inch of sand—then eggs and sand alternately until the box is full; before the cover is screwed on, place the whole for two hours in water and ship it.

I would recommend that it should be kept in a place where the temperature is equable, and they will keep perfectly well for

two months or more. When you wish to take them out, lift the cover, and place the boxes in pure water for a couple of hours, after which the eggs may be removed safely and without injury.

I once transported twelve hundred trout, of all sizes, to one of my ponds with perfect safety, from a distant brook, thus, without changing the water, making four journeys.

A large tierce was put upon a spring cart, and filled with pure spring water, into which an abundance of ice was placed. As the trout were caught by treading the brook, and thus driving them into a net, they were imprisoned in the tierce without handling, and arrived at the pond in safety; without ice, they would have perished in half an hour.

You may carry young salmon or trout in glass jars by railroad any distance without changing the water, by placing a few aquatic plants in with them.

I am convinced, that with judicious care, and ponds suited to the purpose, a branch of industry might be formed that would increase the wealth of the party attending to it unparalleled by any other business.

Let me, then, recommend all gentlemen living near the coast on Long Island, and in New Jersey, wherever facilities offer, to make salt water ponds, by calling to their aid a portion of the sea, which may be carried inland by means of a short canal, and therein place fish to fat, besides breeding oysters. One fish so prepared for the table would be worth more as a luxury than six taken directly from the ocean, from the fact that the severe exertion required to be made by them to take their wary prey, only preserves their bodily health and strength, without adding to their fattening propensities. In such a pond, oysters might be artificially fecundated in such a manner as to afford very interesting results to science. I have been engaged some years experimenting with these admirable mollusks, not only in ponds where I have beds planted, but in the Hudson river also.

I have on several occasions spoken of the depth of the ocean, and will now state the pressure that fish must sustain at certain depths. At ninety-three feet a shad would be compelled to bear about the weight of sixty pounds to every square inch of surface

on his body. At three hundred and sixty-one feet, one hundred and eighty-one pounds; at six hundred and six feet, two hundred and eighty-six pounds; at four thousand two hundred and six feet, eighteen hundred and thirty-one pounds to the square inch; at six thousand feet, over one ton. Whales sometimes descend into the depths of the ocean four thousand nine hundred feet, when they sustain considerably over two hundred thousand tons, nearly, if not quite, one hundred and thirty-eight tons to each square foot of surface exposed.

A column of sea water thirty-three feet in height is about the same weight as a column of air of an equal base, extending from the earth's surface to the atmosphere's limit. When a tremendous gale of wind passes over the ocean, fish will find it perfectly tranquil at the depth of two hundred and fifty feet. By diminishing the friction of the wind by the use of oil, or ice, you may make the surface of the sea quite smooth.

The Leech (*Hirudo Medicinalis.*)—This genus of suctorial animals I placed in two ponds some ten years since; they were from Sweden ; their habits are aquatic, and they are supplied with a sucker at both ends. After studying their characteristics for a long time, I found that they deposited their eggs, and then collected them into small balls and covered them with an excretion.

I have counted in a leech eighty-five soft rings, by which means it gathers itself up, and swims with great agility. The head is small, and skin black, edged with a narrow line of yellow on the side, and yellow spots on the back; the abdomen is red, interspersed with yellow spots. The mouth is armed with three cartilaginous jaws, so constructed as to form three radi of a circle, each having two rows of sharp semi-circular saws, with which they cut the skin by a sawing motion. This accounts for the triradiate form of their bite. Their digestion is very slow; a single meal suffices for a year. They have but one intestine, a stomach with cœcal sacs, and an æsophagus. I have been able to detect eight eyes, situated on the sucking surface, above the mouth, but I believe they have more.

Leeches are becoming scarce, from the fact that many errors are committed in the usual method adopted for preserving them.

Being aquatic animals, it is considered sufficient if they are abundantly supplied with water, which is not the case. It is a well known fact that they breathe throughout their whole surface, and change their skins once a week; their bodies are covered with a mucilaginous substance similar to the eel, which enables them to move through the water with ease and celerity, besides preserving an ærial stratum near their respiring surface. When this matter is present in excess it kills them. They crawl over some resisting substance in their native element and rub it off; but when confined in water alone they are unable to denude themselves, and consequently die in large numbers. If you would preserve them for a long period, furnish them water, with moss, gravel, &c., and change it once a week in winter and twice in summer. As parasitic animals attack and destroy them, they must be carefully watched. To enable you to judge what immense numbers are used by the medical profession, it is only necessary to state that nine millions are imported into London annually, by only five dealers. Two years since, I sent a raw Irishman into a leech pond to remove some willow limbs that had fallen, and when he came out his bare legs were bleeding profusely from the bites of some thirty leeches that had attached themselves thereto. The man never having seen a creature of the kind before, ran a mile and a half to his fellows, screaming the while that he would blead to death.

Permit me to inform the Club that it is possible to stock every stream in the State of New-York with all the desirable varieties of fish in a single season, and all the waters in the United States that can be reached by railroad in a single year. Breeding ponds might be arranged along the Erie canal at a trifling expense, in which billions of salmon and other fine fish could be artificially raised and prepared for the purpose, then turned into the canal to distribute themselves. I have exercised all the mind I possessed, in a private manner, for the last ten years, to stimulate naturalists, physiologists and agriculturists to fish manufacturing, without the least success, and finally offered the State to accomplish the object at my own expense; stating that fish as an article of diet abounded in nutritive qualities, and to increase its abun-

dance in our rivers and streams would be a benefit to all classes of people, and open to the public a new branch of industry, besides increasing their alimentary resources by creating a perfectly inexhaustible process of production. It is only necessary to say that, after some deliberation, in Senate assembled, my offer was declined.

The Hag.—Among the cartilaginous fish there is one known as the hag, which is possessed of a very remarkable mode of escaping its enemies; by creating a vacuum with its lips, it adheres with such tenacity to fishes that they cannot shake it off—like the leech, it lacerates with its teeth, and draws the life-blood from the object of attack. Thus fixed, it offers a tempting bait, and might readily become an easy prey were it not that Providence has afforded it a means of escape of a remarkable character. When danger approaches, the hag emits a species of excrement of a slimy nature, which surrounds and conceals it from view. This matter is so abundant that he can continue to emit it until a large tub of water is thoroughly imbued, and after a short time it assumes the transparency of glue, and may be drawn into long threads. This fish has neither ventral nor pectoral fins, and its body appears devoid of a head, terminating in a circular thick lip.

The Torpedo.—This wonderful fish has been gifted by the Supreme Being beyond all the animals of the terrestrial world, and in some respects even man. It has been armed, to defend itself, with the lightning of heaven, which it employs, as we do gunpowder, to amaze, stupify and even destroy the inhabitants of the ocean. The cat, during certain changes in the weather, is capable of accumulating a small portion of electricity, but not sufficient to arrest its prey; but the torpedo conceals himself in the mud, well knowing that he possesses the power of destroying, through the medium of a shock, any simple unsuspecting creature that may be so unfortunate as to pass over him. That self-sufficient biped, man, may charge a battery with this wonderful element, and work wonders with it, but cannot use it independently of other substances, as the electric fishes can, for offensive and defensive purposes.

This power in the Torpedo appears to extend on both sides from the head to the tail, and consists of longitudinal bands or fibres, containing membranous elongations forming hollow tubes, some of which are quadrangular, others hexagonal, pentagonal and polygonal, each of which are divided by a membrane into dissepiments, connected together by blood-vessels. In each organ there are about one thousand tubes, which I suppose form the electric power ; these tubes are all closed by coming in contact with the skin, and are all filled with a species of jelly. I imagine the upper surface of the longitudinal bands forms the positive electricity, and the lower the negative. The back of the torpedo is convex when lying in a natural position, but the moment he strikes it becomes concave. Immediate contact with the object struck is not necessary, as he can destroy at a distance, and always emits a spark of electricity. These extraordinary batteries were given this class of animals not only to defend themselves, but to obtain subsistence. They are much dreaded by all voracious fish, as they invariably feel invisible strokes whenever they approach.

The Electric Eel (*Gymnotus*)—Possesses a battery twelve times more powerful than the torpedo, and is as much feared by man as the inhabitants of its native waters. Mules, horses and other animals, have been frequently destroyed by passing through creeks infested by them. They may be found in every pond and stream of water from the 10th degree of north latitude to the equator.

Its organs of electricity, four in number, are situated directly under the tail, occupying nearly a third part of the fish, and forming a battery equal to twelve hundred square feet. By placing both feet upon an ordinary sized eel, fresh from the water, a shock will be experienced far more violent than that produced by a Leyden phial, or the pile of Volta.

The same shock received in the vicinity of the heart would cause instant death. If you lay but one hand on the eel, a moderate shock will be felt, but if both hands are so placed they will be paralyzed for years. Still, if the person is afflicted with nervous fever, no shock will be experienced.

After the eel has discharged an accumulation of electricity, his courage leaves him, and he becomes perfectly harmless for a time, and flees from the animal with dread, that he had just before pursued with fury. Quite an abundance of food is required before he can again accumulate galvanic power. He can emit sparks of electricity that will kill an object fifteen feet from him, and may be immediately deprived of electric power by contact with loadstone.

As far as ascertained, all the fishes that possess this wonderful power may be classed with the Genera Trichiurus, Tetrodon, Gymnotus, Malapterurus and Raia; the three last are the most remarkable, and all their organs are unlike in situation and number; the general organization is accommodated to their individual mode of life.

The Malapterurus is an electric fish, whose organs of electricity surround it directly beneath the skin, forming a mass of tissue of a cellular nature, presenting the appearance of pork, and consisting of fikes interlaced together, forming a perfect net-work of cells, completely full of albuminous matter. Attached to this there is a nervous system, entirely differing from that of the electric eel and torpedo, and not unlike that of many other fishes, which organ is formed into two parts by a longitudinal septum. The Arabians were once very successful in cultivating the sciences, and they not only observed this faculty of the Malapterurus, but likewise noticing the affinity between the lightning of the heavens and that of this fish, they named him Raash, or thunder. His senses of hearing and smell have no external opening; the smell is the most acute. By it he discovers his enemies and his prey at a very great distance, through the thickest gloom and most violently agitated sea. The organ of this sense is directly between the eyes.

The Anableps—This is a viviparous fish, having four eyes, the cornea of which is divided into two equal parts, each part forming a sphere, one placed above and the other below, but united by a membrane. On examining the lower portion, you will perceive a large iris and pupil with a crystal humor below it. This structure is unparalleled in any other fish, as it is at all times able to see distant and near objects. It feeds upon small worms,

which it can see below it, and at the same time its enemies at a distance above it. If the fins of this fish are mutilated, they are again reproduced. It may be cut, dismembered, and dreadfully torn, without appearing to suffer in the least. The shark may likewise be harpooned, and large portions of his flesh taken off, without preventing him from pursuing his prey, until completely exhausted from the loss of blood.

The anableps, when dead, emits a strong phosphoric light, similar to that caused by the ocean sun-fish, when alive, which, while swimming at night, yields a phosphoric light, similar to the reflection of the moon in the water, from which cause it has been called moon-fish. The reason why Providence has given to the sun-fish this property, and his method of producing it, will probably never be ascertained. When they swim in large shoals, illuminating the ocean, as if an army carrying lanterns were moving through the waters, the spectacle impresses the mind with the unceasing wonders of nature.

Few mammalia, with regard to magnitude, present to the human eye such tremenduous masses, as many shoals of different fish. You may leave the enormous whale entirely out of the question, and what terrestrial animal have we that can favorably compete with the phosphoric shark? Then come the rays, which exceed them in size, and often in their rage elevate themselves to a great height from the water, and fall again into it with such force as to make it roar and foam. The sea-devil is so large as to require seven or eight pair of oxen to draw it on shore from the sea. When we consider that whereas a land animal, such as an elephant, gives birth to a single individual, a codfish produces millions, we may well conceive that if nature had not provided many checks, the water would soon be filled to repletion.

The Flat-head and Round-head Hassar—The former of these fish constructs its nest with leaves, and the latter with grass, after which they deposit their ova, and cover them with great care; and both male and female, for they are no doubt monogamous, defend their nests with watchfulness until the young fish come forth. The hassar, in very dry summers, is often seen in vast numbers, making long journeys by land, in search of water.

And I am, therefore, led to believe that they swallow air, which is no doubt decomposed in the usual manner in the alimentary canal, affecting favorably the blood vessels as brought in contact with them, precisely as in ordinary respiration among animals. Their blood is likewise ærated whenever they raise their scales, and I think this is the case, more or less, with all fish. We know that the blood cannot be brought to the air; therefore, nature carries the air to the blood, by a wonderful system of ramified continuous vessels, known as tracheæ, which are eternally engaged distributing atmospheric air to all parts of the body. The tracheæ, by a singular mechanism, are always kept pervious, being constructed of three layers; the internal and external are membraneous, but the interior one is formed of an elastic thread, coiled in a cylinder, which keeps the tube expanded, and consequently full of air.

The organs of smell in this fish, as well as others, are placed in cavities on each side, in front of the head; they are blind sacs, and do not communicate at all with the mouth or thorax; they have two external openings to each sac, the entrance of which is furnished with a valve, formed by a moveable membrane. I have not been able to discover any organs of smell in the oyster, clam or muscle, but in the snail I have. By placing the oil of turpentine in their vicinity, they immediately indicate their displeasure by withdrawing into their shell.* The hassar, as well as all other inhabitants of the water, have no external ear. The passage leading to the tympanum is a winding tube, composed of cartilage instead of bone, and the external orifice, even in the dolphin, is only large enough to admit the point of a small pin, showing plainly that these important structures are calculated for preventing the entrance of water in undue quantities into the vestibule. The same care is shown in all departments of the animal economy. The external ear of the hippopotamus is furnished with a valve, composed of a membrane, ever capable of closing the outward opening of the meatus, and thus preventing the introduction of water when he feeds at the bottom of rivers.

* I once cut the head of a snail off, and in a few days it was reproduced; also, the fins of fish, and they were renovated.

The eyes of the hassar have a distinct cornea extension to the iris, but only of very slight convexity. This appears to be the case with all fish and animals inhabiting water. The difference of density between the external medium and the cornea is inconsiderable, as the refractive power of the cornea, however convex it may happen to be, is small. The crystaline lens performs the necessary refraction of rays. The cornea is, therefore, nearly always perfectly flat, and the globe of the eye in the shape of a hemisphere; while the lens is spherical. The sclerotic coat of the eye is of great density and thickness, and aids it in retaining its form. The eye of the shark is supported at the bottom of its orbit by a cartilaginous point that affords it the facility of turning on a pivot. His visual organs are infested by three varieties of eye-worms, which sometimes interfere with that distinct sight for which this fish is celebrated. When these animalculæ increase in number to about three hundred in both eyes, they cause cataracts, and the fish becomes blind. This worm resembles the leech, except that its sucking apparatus is in the middle. And what is singular, each of these creatures has a parasite to support which belongs to the genus Monas, and is much smaller than the Atomus. All fish are infested with these worms.

And not their eyes alone, but their gills likewise. These latter appear to be compound animalculæ, having one body but many mouths, each containing precisely the same organs. Their fœces, as in the polypes, pass out at their mouths. Last week I observed a perch taken from the river, that appeared to be inactive and indisposed to move. On examining him, I found attached to his tongue a fresh-water branchipod, which could not be taken out without force sufficient to break the arms attached to his sucker. On removing him, I found a small insect clinging to his abdomen, which likewise lost its arms on being detached. Its mouth consisted of a tongue, upper lip, two mandibles, two pair of maxilla, and it had sixty legs. One eye of the perch was covered with a cataract, and the other partially so; in each there were numerous planaria, presenting the appearance of a cross, each arm of which was possessed of an alimentary canal, circu-

lation and a sucker. Thus God limits the inroads of voracious fish, and gives each individual species an opportunity of escape.

The teeth of fish, like those of terrestrial animals, may be divided into molary, incisive, and laniary, distributed according to mode of life and species: the palate, tongue and throat are often armed with them; some are immovable in their sockets, and others may be depressed and elevated at the will of the owner. There are herbivorous fish that have three rows of molar teeth. The jaw of some such fish was found in British North America with six rows of molar teeth.

There are other fish that migrate when the waters of their native ponds dry up, and march by land in search of others. They travel in large droves, generally at night, with a motion like a two-footed lizard. A strong arm constitutes the first ray of the pectoral fin; using this as a foot, they thrust themselves forward with their tail, which is elastic, almost as fast as a man can walk. It is supposed that they are furnished with a supply of water, retained by some internal arrangement, from the fact that when taken up and rubbed perfectly dry, they become moist immediately after.

Without the coöperation of a liquid, fish cannot expand the apparatus on which the blood vessels depend for distribution. When taken from the water, this effect cannot be produced, and the fish fails, after reiterated exertion, to raise the bronchiæ, and dies from suffocation. I have killed a fish almost instantaneously by preventing the expansion of the bronchiæ, by passing a ligature around the opercula. The surface of the gills in the skate is fully equal to the entire surface of the human body, and it has been supposed that they, as well as nearly all other fish, ejected the respired water through the nostrils; but this cannot possibly be the case, as I have never been able to discover any communication between the nostril and the mouth of any fish.

The electric fish are emulated by a small one of a different tribe, that catches its prey, chiefly flies, by throwing upon them a gross substance that causes their wings to adhere together. They are called fly-shooters, and are remarkable for their very singular form, brilliant colors, and the quickness of their graceful movements.

The Fishing Frog.—This singular fish has an attenuated tail and enormous mouth, but no force or means of defence; is a slow swimmer, and is, consequently, compelled to procure its subsistence by stratagem. It covers itself with mud, sea weed, &c., and agitates by muscular power the filaments of fringe that cover its body. They appear so much like worms, that fish approach boldly to seize them, when they are swallowed by a single rapid movement of the fishing frog, and pass down his capacious throat with great ease, where they are retained by a multitude of teeth. The stomach of this extraordinary fish, like the Gillaroo trout of Ireland, is endowed with great muscular power, adapting it, like the gizzard of fowls, to perform the two-fold action of digestion and mastication. When they swallow oysters, clams, or other shell fish, they swallow stones likewise, to assist in breaking them up. The common trout has been known to do this likewise.

Many fish live altogether on shell fish, which require great power and muscular strength in the jaws, besides strong grinding teeth, to break them down and triturate them sufficiently to be digested; among these may be named, in addition to those mentioned, the mullet, wolf-fish and sepia.

The Tetraodons.—These fish are peculiar, from the fact that they are provided with the remarkable means of instantaneously assuming the form of a balloon, by swallowing at one gulp an enormous quantity of air. When the abdominal portion becomes light, the body immediately turns over, and the fish floats upon his back, without possessing the least power of locomotion, but is driven about at the mercy of the waves in a state of perfect security, from the fact that his body is thickly covered with sharp spines, which present a formidable front to enemies on all sides.

This fish is enabled to roll itself on the shore for a considerable distance from the water, showing that a most perfect relation keeps pace with the peculiar circumstances in which different varieties of fish may be placed. Those being weak are studiously protected by a dull integument, covered with spines, strong enough to guard it from the most bold assailant; while the voracious tribes enjoy powerful muscles, to enable them either rapidly to progress towards their prey, or escape their enemies. As a general

rule, however, fish move with the greatest rapidity through water, and apparently without effort or fatigue. The salmon travels weeks together at the rate of twenty miles an hour, and sharks cross the Atlantic in company with the fastest merchantmen, receiving maintenance the while from the inexhaustible fund prodigally prepared by harmonious nature, whose minutest drop of water contains four hundred millions of insect life. And yet man, instead of gloryfying God, his maker, for these creations of innumerable hosts of creatures, furnished to feed those that gratify his appetite, attributes their organizations to unguided physical agencies, instead of that Almighty Intelligence that planned, executed and now maintains the whole.

Swamp-pines.—This is the name given in Carolina to a fresh water fish that is found inhabiting ponds, which often during hot summers become dry, when the fish prepare themselves to migrate to the nearest pool, by closing a membrane attached to the mouth, which may be called a compensating apparatus, which enables them to live for a time out of water; and they travel by leaping, in immense squadrons, with their heads invariably pointed towards the nearest pond, being directed by a wonderful instinct. Other fish, similar to these, when reduced to the same extremities, by the drying up of the elements so indispensable to their comfort, dive deep in the mud, where they remain, almost consolidated into stone, for several months, awaiting the return of the rainy season, which awakens their vitality, and mercifully provides them with the means of escape.

The object of God throughout the entire world, is to balance the numbers of all the different kinds of animals, from the monod that cannot be perceived by the naked eye, to the monstrous whale, so that a proper proportion, as far as numbers are concerned, may be preserved in quantities sufficient to accomplish the design for which they were formed. And as the meanest animalcule becomes the food of thousands of fish, as well as the grandest and most gigantic animal, the whale, so it was created devoid of a digestive nervous system, and is therefore incapable of suffering pain.

Dr. Waterbury took up another important point on the subject of the day, the anatomy and physiology of fish.

He commenced by a fitting tribute of commendation upon the labors of Mr. Pell, the President, who, he stated, had given to the world many facts hitherto unpublished, because unknown, respecting the habits of fishes. It was very interesting to study the outlines of the physiology of the fish. Professor Agassiz had traced more than the outlines, and had promised to publish his investigations, but had not as yet done so.

The Doctor explained how the fish lives and breathes by suction. The whole animal kingdom subsists upon the vegetable kingdom. Nor is that law violated in the case of fish. They are not like Kilkenny cats, that devour each other, leaving nothing but a very small piece of each of their tails. It was well it did not take much to support fish. They do not expend a great outlay of muscular power. A fish is balanced by a small amount of force in the water. The higher the respiratory power, the greater the necessary activity of the digestive and nutritive apparatus. Now the fish requires no food to raise his temperature above the low grade of a cold blooded animal. Fish might even be frozen so as to break when allowed to fall, and yet be in such frozen state susceptible of resuscitation, by immersion in cold water. They needed little food truly. Gold fish may be artificially kept a twelve month without food, though in that state they will not breed. Mr. Pell had kept a mud turtle a year without food. The creature was half way between a warm and cold blooded animal; and if the turtle could bear such deprivation with impunity, much more so could a fish. Where did fish get their food from when under the ice in frozen ponds?

Dr. Smith was very anxious to prevent any misapplication of the truth respecting frozen fish. Water became ice at 32° Fahrenheit, but that was not the maximum temperature of ice. Such ice was comparatively warm ice. It was plain that the frozen fish had not been exposed to a temperature sufficiently low to effect such organic changes in the structure of the fish as were incompatible with the further relation of that structure to the vital principle.

Dr. Waterbury then proceeded to demonstrate from a neatly dissected specimen, the anatomy of the circulatory organs—as to

respiration, M. Dutrochel had explained well how the ascent of sap, its exposure, and that of the blood in the animated tribes was a matter of transudation. If dark nervous blood were exposed to the air through the bladder which might contain a portion of it, oxygen would soon be absorbed from the air, and the scarlet tinge observable. The Doctor made a little experiment with solution of iodide of potassium and acetate of lead, which were made to communicate through a bit of Chamois leather, the double decomposition being almost instantaneously observable. He then explained and demonstrated the circulation in fish as single, in contradistinction to that of the double-hearted mammalia, who have lungs. He described the air bladder and its uses. Fish make nests, like their cousins the birds. He explained the peculiarities of the mode of the fecundation of oviparous and viviparous animals.

Mr. Field wished there were more fish to eat up the mosquitoes.

Dr. Waterbury proceeded to demonstrate the double jointed arrangement of the fish's back bone. You, said he, and I were once fish, at least we lived the lives of fish, we breathed as do fish. He explained the peculiarity in the silver eel which causes the fishmongers to imagine he is a snake and destitute of gills. It merely is that they are covered externally by a delicate membrane, and with a little water in his mouth he can live for a short time on the grass of a wet meadow. Fishes are the oldest living inhabitants of the globe. Fish with one lobed tails had become imbedded in the red sandstone, and existed upon the earth long before any other creature made a noise. As a class, fish compose nine-tenths of the animal world. What did the shad live upon? It was a curious enquiry. And why did he regularly go up the North river?

Dr. Waterbury presented a dissected codfish, to illustrate a drawing upon the blackboard, showing how a fish lives upon what the fishermen calls "suction"—a sucking in of air and water, highly charged with oxygen. He also illustrated the fact that fish have hearts, and showed where they were situated, at the base of the gills.

Subject for the next meeting, proposed by Prof. Mapes—"Winter preparation and cure of manure." Solon Robinson—"Treatment of stock."

Adjourned. H. MEIGS, *Secretary*.

March 2, 1858.

Present—Messrs. President Pell, Dr. Waterbury, Dr. Smith, Dr. Wellington, Solon Robinson, Judge Scoville, Mr. Smith, Mr. B. Pike, Mr. Bixby, Mr. Pratt, Mr. Pardee, Hon. John D. Ward, T. W. Field, of Brooklyn, Fuller, Wm. B. Leonard, Hon. Hugh Maxwell, Mr. Turell, Mr. Davoll, Dr. Peck, of Brooklyn, and others—fifty in all.

Hon. Robert S. Livingston in the chair. Henry Meigs, Sec'y.

The Secretary read the following translations and extracts from the works last received by the steamers, &c.

The *Revue Horticole*, Paris, January 1858, contains an article on the scientific advantages of very high microscopic power in the study of organized bodies. This powerfully increased vision is no less magnificent in the infinitely small than in the infinitely great. Unknown worlds above, as well as below our ordinary visual powers, are now in the course of observation, even so far in the composites of bodies, as to have proved superior in value to the best results of chemical analysis.

Mr. Pell, the President of this Institute, first collected the European (chiefly London) microscopic observations on drugs and on materials for our tables. Those facts are inestimable for health, and are detectors of villainy in our feeders, infinitely superior to all law and all police. The powerful microscope brings their invisible properties (to the naked eye) into broad sun light.

The Institute should be provided with these great powers of investigation, to extend in every direction its all searching efficiency. There is scarcely an organized body which under its operation, must not yield up to demonstration, the wonders in it.

While the Institute may at present give up the study of the Heavens to Lord Ross, Leverrier, Adams, and their brothers of

the worlds above us, we of the Farmers' and Mechanics' Club, of the American Institute, may deeply demonstrate the structure of all bodies of our mines, farms, forests, fruits, meats, diseases, &c. The admirable success of Ebrenberg, in this department of science, points to further discoveries.

The *London Farmers' Magazine*, of Feb. 1858, contains twenty-seven pages devoted to the "Cattle plague, Steppe-murrain, or Rinderpest," now prevailing on the continent of Europe, in Holland, Belgium, Hamburg, Westphalia, Hanover, Lubeck, Mecklenburg, Schwerin and Strelitz, in Saxony, Prussia, Cracow, Bessarabia, Galicia, Moravia, Bohemia, Wurtemburg, Rhenish Prussia and Bavaria.

It is considered unlikely to cross the channel to England. Great care is every where taken to arrest its progress by destroying the infected cattle.

The American Institute was reproached by a few men, of bad taste, for exhibiting noble animals in our Crystal Palace last fall. At the Sydenham Palace, which is worth thirty millions of dollars, there is an immense exhibition of poultry this winter. The ears of visitors were dinned by the "deep ophicleides and double bass of the Cochins and Bramah Pootras, and the shrill Piccolos of the Bantams—from the trumpets of the ducks and geese to the Bassoon modulations of the turkies and hautboys of the pigeons. To give an idea of the immense number of fowls now in the long spacious gallery at the south extremity of the palace—Spanish fowls, 254 ; Dorkings and their chickens, 502 ; Cochin Chinas, 265 ; Bramah Pootras, 112 ; other breeds too numerous to mention. Ducks, 12 lbs. each; a turkey, 35 lbs.

Le Bon Jardiniere, 1858, presented by Mons. Vilmorin to the American Institute.

We translate the following passages, viz:

NOVELTIES.

Abutilon Marmoratum—Dahlias of 1857—We recommend the following:

Augustein Lelemier Rose amaranth, salmon hue; Calypso Tender Rose, with white centre; Comte de Morny, velvet violet, pur-

ple, edged with white—yields many flowers; Duc de Malakoff, deep carmine red; Lady Scott Douglas Rose carmine, large flower, striated deep chesnut color; the Mirror, reddish orange, striated crimson, and others, new and beautiful.

Petunia, new—Hybrid seedlings, large flowers, deep white, plumy, greatly spotted with tender violet.

Phlox—Two remarkable novelties.

Roses—Three new fine ones.

Salvia, whitish cerulean—Grows spontaneously in the cold regions of the Western Cordilleras.

DIOSCOREA BATATAS—CHINESE YAM.

Since 1855, has been planted on a large scale. Some important facts in relation to it have been ascertained—among others, its seed at the Museum of Natural History and elsewhere. This promises some interesting modifications of the plant and tuber. I do not despair of seeing it in our fields some day or other. At present we rate it as a legume of the second order. In fine, as a vegetable for table use, it is easily cultivated, crop tolerably large, keeps well with little or no care, taste agreeable or hardly any at all, and this is also the case with most of our essential alimentary substances.

Mr. John D. Ward—Some years since I resided in Vergennes, Vt., where the character of the soil is such that the common white globe turnip cannot be raised as an ordinary crop. The difficulty is, that the plants are either entirely destroyed by worms, or if they escape complete destruction, their growth is dwarfish and sickly, and when taken up their roots are found perforated, and the exterior furrowed in all directions, so that they are entirely useless for the table. The Swedish turnip grew without being at all disturbed by the worms. Being desirous of obtaining the white turnip, also, I after two or three ineffectual attempts, secured a small bed of them, and as soon as the rough leaves appeared upon the plants, sprinkled the ground with salt, at the rate of perhaps a pint of salt upon each square rod; the result of which was a tolerable crop of fair, smooth turnips.

CELERY.

Solon Robinson—I have received another letter from the gentleman who wrote to me before upon the subject of celery, which I hope will elicit some further information upon this important article of cultivation. It reads as follows :

"*Johnson Creek, N. Y., Feb.* 22, 1858.

"I noticed the remarks in the papers relative to my letter, but as the remarks were of too general a nature to benefit those who wish to learn the minutiæ of celery growing, I make one more effort to gain the desired information. I sow my seed in April, on a bed well manured with horse dung, sow broadcast and rake in lightly, weed them out and set them in trenches, about the middle of July, and the plants are then not above three inches in height. I set them in trenches eight inches deep, with about two inches of manure at the bottom, slightly covered with earth. I use no boards, nor anything to cover or shade them. They seem to take a back-set, but finally start and grow quite thriftily. I hill up five or six times, scraping the dirt up with the hand, holding the plant with one hand and keeping the stalks pressed close together to prevent the dirt from falling into the centre of the plant. I grew upward of sixty dollars' worth this year from sixteen rods of ground. It was not of long growth. I find that thousands of the plants die in the bed, just below the surface of the earth; some invisible gnat, fly or worm gnaws the root. Yet the plant looks green for some time, but at last dies, being incapable of drawing sustenance from so small a thread as is left from the gnawing. After setting the plants in trenches, they blast or rust; they look as though some worm gnaws or sucks the stalks, and they turn yellow in spots or streaks, to such an extent as to make them unsaleable. I have heard that salt sprinkled around the stalks before hilling, would prevent the rust. How should guano be applied, or phosphate, for manure? What quantity should be placed in a trench one hundred feet in length? Should it be mixed with earth, or placed in the trenches and covered with earth? Manure is out of the question in this part of the country for an acre of celery. Guano or phosphate must be used,

or some of that class of fertilizers. Please let us country gardeners have the much desired light.

"Yours, truly, L. W. PAINE."

Mr. Fuller, (a gardener of Brooklyn.)—I generally spread straw or leaves over the ground for the seed bed of celery, in April, and burn it off. This serves to give a little potash, and also to kill insects. I sow the seed in trenches, lightly covered, and thin out so as not to let the plants touch. I transplant in a wet time—the last of July or first of August—into trenches six or eight inches deep, and four feet apart, the earth being deeply disintegrated previously. I manure in the bottom of the trenches, and afterwards use ashes and salt. The plant having its native locality near the sea, bears a tolerably large dressing of salt. I use guano sometimes, but have never measured the quantity, and do not think it important how much is used, so that it does not come in contact with the plants. It may safely be used dry, well mixed with the soil, or in a solution of about two pounds to a barrel of water. One of the most important things about celery culture is, that from the time the seeds sprout the plant should continue to grow without any check in transplanting or after culture.

Mr. Pratt, of Williamsburgh, explained the mechanism of his patent steam plow, by drawing on the blackboard, &c. A large roller precedes the machine, and by means of its size and weight holds on the soil with sufficient force to move the plows which follow it. One man manages the whole, and can plow suitable land the ordinary depth, forty acres in one day.

Doubts were expressed by some of the members.

Rufus L. Waterbury, M.D., who had proposed the continuation of the discussion on the artificial propagation of fish, exhibited a sea bass, so opened to view as to enable him by means thereof to explain minutely its vitals, its heart, gills, &c., and, by drawings on the blackboard, the peculiar organization of its back bone.

The regular subject of the day, viz, "the treatment of stock," being called—

Mr. Pell, the Chairman, remarked: You are all aware that the quality and kind of food given a cow, has immediate influence

upon the milk. This fact is perfectly familiar to every dairy farmer, who knows that the color and taste of milk and cream are affected by the plants on which the cow feeds. For example, if fed on turnips, cabbages, or wild onions, it is immediately perceptible, not only in the milk, but the butter. If she eats madder, the milk is blood red; if safron, yellow. I have often noticed, that when my cows are fed upon one pasture, they produce a large quantity of fatty matter, yielding much butter; and on another, casein or curd, adapted to cheese making. This has given rise, in dairy districts, to the practice of varying the food artificially, in addition to the natural pastures, according to the result desired to be obtained. By the addition of potatoes, beets and oil cake to the natural pastures, I found the curd or cheese much increased in the milk; then by feeding dry hay, in the same connection, the curd decreased very perceptibly, and butter partially increased. The fat of butter and the fat of animals, consists of a solid and fluid portion; the fluid is known by chemists as oleine, which is identical in all animals, and is the same as olive oil. It abounds more in the fat of the hog than sheep, consequently pork fat is much softer than mutton suet. The fat of man is precisely like that of a goose, and similar to that which exists in butter and olive oil, but different from that of the sheep, hog or horse. The former is called margarine, the latter stearine. Oats contain three and a half per cent. of fat; oat straw, five and a quarter per cent.; wheat, two per cent.; and wheat straw, three per cent.; dry clover hay, two per cent.; clover in blossom, four per cent.; Indian corn, eight and three-quarters per cent.; rye, one and three-quarters per cent. If you desire to form one hundred pounds of bone in your animal, it will be necessary to incorporate with her food thirty-six pounds of gelatine, five pounds of carbonate of lime, four pounds of phosphate of magnesia, one pound of soda, one pound of potash, two pounds of common salt, fifty-five pounds of phosphate of lime. And if you would increase the hair or horns, give at different periods portions of sulphur, amounting in the whole to five pounds. The body extracts all the elements of which it consists, from the food; and if the farmer does not see that it is afforded in proper proportions and variety,

the animal cannot be built up and supported. It is well to remember, that nature has so formed the substance of the muscles in the food fed to our animals, that the stomach is only compelled to select the matters required for different parts of the body, and despatch them thereto. The plant compounds and prepares the phosphate of lime, phosphate of magnesia, common salt, albumen, gluten, fat and casein, which it extracts from the soil, by the commands of nature, to divide the labor of building up living bodies, between the animal and vegetable kingdoms.

The object nature has in furnishing animals with fat, is to lubricate the joints, separate the muscles, protect the internal viscera, make the skin flexible and soft, fill up hollows, protect the bones from outward injury, and make all parts plump and round. And when it accumulates largely, it may be considered an effort of nature, to lay in a store of food in times of abundance, to be made available when seasons of scarcity arrive. I have on several occasions stated, that I could convert a full blooded calf, either Ayrshire or Durham, that would if left to nature take after the parents, and present to the eye when born all that the breeder could desire, into a coarse, ill-formed, badly limbed, raw-boned creature, by the quality and quantity of food administered to the mother, not only to sustain her animal economy, but at the same time to build up her unborn calf. A cow to sustain herself alone, will eat, if permitted so to do, more than a fifth of her weight in turnips in twenty-four hours, or one fifty-fifth of her weight of hay. To nourish the calf, then, an additional quantity of food must be administered daily, as pregnancy progresses, calculated to grow the bones and muscles of the calf. It must contain starch and sugar, as the mother not only breathes for herself, but her young, more oxygen is taken in and more carbon exhaled. To supply the carbon, farinaceous food must be daily given. To yield twenty-two quarts of milk, producing twenty-four ounces of butter, a cow would be compelled to eat one hundred pounds of hay, as that quantity contains twenty-four ounces of fatty matter. A horse fed on corn cannot do as much work as a horse fed on oats, because the corn developes his adipose tissues, and the oats his muscular.

By a combination of food, last fall, fed to a high-bred Ayrshire cow, caused her to produce a calf so ugly in form and limb, that I was unwilling to retain it on my farm, and, therefore, when it was sixty-three days old, sent it to Mr. Thomas E. Broadway, butcher, Clinton market, to kill. The following is the account he gave me of it:

Live weight,	450 lbs.
Meat,	272 "
Head,	24 "
Liver,	12 "
Feet,	12 "
Skin,	56 "

After the calf was born, the demands upon its mother became far greater, and the food was increased in quantity, quality and variety. I used sulphur, chloride of potassium, lime, iron, phosphorus and chloride of sodium. Were these supplies not adequate, the mother would have become lean in her body, and feeble in her limbs, and the calf stinted. As soon as the calf begins to eat, the mother secretes less milk, and begins to fatten rapidly; and if the food is continued, will be fit for the butcher in a few weeks.

The food given to the mother, while the calf is young, should be such as to make the milk rich in curd, to increase the growth of muscle, by the use of bean meal in hay tea; rich in phosphates, by the addition of ground bones, to enlarge the bones of the calf. When the mother is fed a number of different substances, they mingle in her several stomachs, and out of them she supplies the curd and butter to form the fat, and the phosphates to make the bones. She changes them chemically, in such a manner as to present them to the calf in a state that it can employ them without labor, for the purpose of sustaining its body. How amazing is all this; after the calf is disposed of, the cow can be made to produce much cream for the purpose of making butter, by giving her food that contains a large portion of fatty matter, such as oil-cake, bran &c. If curd is more desirable for the purpose of making cheese, feed clover, or pea straw, which contain casein, or curd. Any food that will fatten a cow, will naturally increase

the butter in milk, in the same proportion that food, which increases the growth of muscle, will add curd or cheese. The temperature of the atmosphere in which milch cows are kept, in winter, affects the quantity of food required very sensibly, as the internal heat of the animal is intimately connected with its respiration. The oftener it breathes the warmer it becomes, and the more carbon is released from its lungs. This frequent breathing causes natural waste, which must be replaced by more food. The greater the difference between the temperature of the atmosphere and the temperature of the animal's body, the more food they require. A constant attention to the warmth of milch cows, in the cold season of the year, is of practical importance to the farmer, as he can thus diminish the quantity of food, as much less will sustain them, than if exposed to cold. Still it is indispensably necessary that the feeder pay particular attention to cleanliness and ventilation, as warmth and shelter may both better be dispensed with than to neglect this. Their stables, as well as their skin, should be kept perfectly clean, if you wish them to thrive.

The daily production of manure is of as much importance to the farmer as the yield of milk, and that depends upon the kind and quality of food given to the animals. After the carbon has escaped in the form of carbonic acid gas, a portion of the food eaten is ejected in the shape of dung. Large framed, raw boned, hard worked cattle, exposed to the cold, if well fed, will produce far more manure than well housed, and warmly kept animals, from the fact that they consume much more. The health of animals cannot possibly be sustained unless you feed them with mixed food; and it must contain, 1st. Sugar, in order that the carbon may be supplied, which is constantly given off whenever the animal respires, in the shape of carbonic acid. 2nd. Fatty matter, to supply the fat which naturally exists in larger or smaller quantities in the bodies of all domestic animals. 3d. Fibrin, to supply the hourly waste of the muscles. 4th. Phosphate of lime, to renew the daily waste from the bony structure. 5th. Chlorides, sulphates &c., to replace the loss of saline matter, ejected in the excrement. The food must therefore necessarily

be such as will build up all parts of the animal economy; and that can only be accomplished with a mixture. Which has a double function to perform to sustain and likewise increase the body. By an experiment, a few years since, I found that an animal confined on a wooden floor, and fed cut grass, would not grow as fast as an animal fed on an earthen floor, or in a pasture lot. This led me to study the motion of the heads of my cattle when feeding in pasture. And I observed that they did not cut the grass, but rather tore it up, and frequently with it, the roots containing earth, which, when taken into their stomachs, must act as an antacid, facilitating digestion. I then gave the animal on the wooden floor, grass torn up by the roots, with the dirt adhering; and his growth immediately equalled those fed on earthen floors, or pastured. If you will take the trouble to examine the mouth of an ox, you will find there are no nippers in the upper jaw; but instead of them a pad covering the convex extremity of the maxillary bone. This is the case with all cud chewing animals. The consequence of this structure is, that in browsing, the grass is partially cut through, and torn up by the roots, because the earth is necessary in the process of digestion. Consequently, for a number of years, I have been accustomed to pull all my corn-stalks up by the roots, and feed them to stock in winter. They particularly enjoy the roots, on account of the dirt contained in them, as well as the large percentage of sacharine matter. And, notwithstanding all the abuse heaped upon corn-stalks, and the woody fibre contained therein, at a meeting of this club, stock infinitely prefer them to hay, and will, if properly fed, consume stalk, cob, corn and root, converting the whole into flesh, fat, milk and manure. The leading nutritive matter in corn-stalks, is sugar; and they have a highly attenuated form of lignin, a woody fibre, which is probably nearly all digestible. Nutritious food is often combined with indigestible matters, such as woody fibre, lignin, &c., which resist the action of the digestive powers, and pass through the alimentary canal with very little alteration. The husks of peas, beans, oats, barley, &c., are composed of this substance, and unless these grains are broken, by the masticating process of the animal, or

prepared before fed, they may not come in contact with the solvent action of the secretions contained in the animal's stomach, and will be voided in an undigested state, retaining their vegetative powers. What a wise provision is this to seed uninhabited portions of the universe, through the medium of birds and animals.

You will find, by experience, that active animals will consume far more, and less delicate food than indolent ones, because the waste of body is proportionate to the activity of the beast.

A cow, giving milk, or nursing a calf, will eat as much food as thirteen sheep; an ox, being fattened, as eleven sheep; a horse, besides oats, as nine sheep; a three year old steer, as nine sheep; a calf, as two sheep.

If you desire that your animals should grow rapidly, make their food available to them with the very least expenditure of muscular energy on their part. Instead of permitting your cow to traverse an acre of land to obtain her morning repast, let her find it within four square rods. Have mercy on your horse, and give him his hay cut, and oats ground, instead of permitting him to perambulate a bare pasture lot, for four hours, to obtain that which, in another shape, he could consume in twenty minutes; thus saving his bone and muscle for a more useful purpose. Cut the turnips for your sheep, that they may eat in ten minutes, the same amount of food that would require the expenditure of an hour's time, in the whole state. Always give food to cattle in the condition that will require the least possible time to eat it. And never, on any account, limit the quantity to a fattening animal. Rather constantly increase it and promote his appetite by changing the diet, and feeding at regular periods; so that he may compose himself to rest, and an undisturbed digestion.

Any animal can be made to far exceed the present stock, by a proper supply of wholesome food. And if a calf, or colt, is deprived of the requisite nutriment, in quantity or quality, he never can become perfectly developed; though he may receive every attention at a later stage of his existence. Internal congestions having already taken place, his constitution has become injured, and the mesenteric glands diseased.

Water is known to us all to be necessary to many parts of the animal economy, as for example the gastric juice, all the secretions, and the blood, which contains eighty per cent, and in fact three quarters of the weight of all animals consists of pure water; grass contains eighty per cent, and in order to discover whether grass would supply the requisite amount of water, for a growing animal to subsist on, I placed a fine yearling bull, weighing eight hundred pounds, in an eight acre lot, without water, for one month, July, during which time he grew finely, and never appeared to suffer for water. At the expiration of thirty-one days, he drank sixty quarts. He was kept fifteen and a half days longer without water, and then drank only eight quarts, leading me to suppose that his constitution was adapting itself to the quantity contained in the grass, as we know habit will accustom the stomach to peculiar kinds of diet, and water, though essential in performing the very important office of dissolving nutritive substances, so that the lacteals may convey them into the blood, is not in itself nutritious.

The Devon, or red cattle of Connecticut, are a very beautiful and peculiar variety of animals, being remarkably well defined in their character, and readily known from every other breed. The horns are long and taper gradually towards the point; their eyes are bright and prominent; the forehead indented, flat and small; the nose yellow, muzzle very fine; and the cheek medium sized; the skin is thin, and hair in some instances curly, in others smooth and glossy; but those having curly hair are supposed to be more hardy, better workers, and feeders. The color is a bright red, and any departure from this, indicates a mixture with some other breed; even a few white hairs in the forehead, are looked upon with suspicion. The head of the Devon ox is smaller than many other breeds; he is quick in his movements, being a fast walker, and of free action, notwithstanding his legs appear to be badly placed under his chest for speed, still he possesses it in an eminent degree, and is of long endurance. His legs are very straight, and the fore arm strong and muscular; the bones below the knee are small and delicate; the tail is set even with the level of the back, though sometimes elevated above, but never depressed below, and has a small bunch of hair at the end.

The Connecticut red oxen are particularly valued for the purposes of labor, being but little inferior to horses in speed before the plow, and are eminently superior to all other cattle for the purposes of the farm. On a clay soil they will be found particularly valuable, on account of their good temper, strength, docility and honesty. Four Devon cattle are fully equal to three horses.

They may be broken into work earlier than any other cattle, say from two years upwards, and will be serviceable until twelve years old, and may then be made fit for the butcher, on hay and turnips in ten months. They fatten faster and with less food, than any other breed known to me. I have used these oxen in preference to all others, for the last twelve years, and turn them off to the butcher when eight years old, weighing dressed about twelve hundred pounds. The last pair I purchased in Connecticut, had horns well placed on the head, and measured from tip to tip four feet eight inches; they were broken to drive singly, plow corn, &c., or to be driven on either side, and would permit their driver to ride from the field on their backs. The eyes of this pair of oxen had a calm complacent expression, which indicated their patient and kind disposition. Their touch was perfect, having a loose skin, apparently floating on a layer of fat, which when pressed yielded at once and sprang back like a piece of soft thick buckskin, and would have been styled in England mossy. When you find the touch as described, it indicates symmetrical form, pure blood, good disposition and fine bone. A thick firm hide, covered with short hair, shows an indifferent feeder. The heads of the oxen in question, were beautifully set on their necks, and appeared as if the animals had no difficulty in carrying them. Their faces were exceedingly long from the eyes to the extreme point of their noses, and very broad across the eyes; their muzzles were small, and nostrils large, ears transparent and large, necks light and short.

The Connecticut red cattle are the offspring of a small bull, and much smaller cow. As milkers they rank low, as far as quantity is concerned, but the quality is superior, so much so, that the Connecticut farmers and stock breeders regard this property as fully compensating for the deficiency otherwise.

The qualities of yielding great quantities of rich milk, and acquiring flesh with facility, are rarely to be found combined in any kind of cattle. But by careful selection and long study, I have formed a breed that do combine these admirable qualities ; they are very large, docile, good tempered, free milkers, supplying a great quantity, rich in cream, and at eight years old, show a tendency to fall off in milking qualities, and acquire flesh rapidly, I have been enabled to cause a heifer of this breed to weigh two thousand pounds at two years old.

It has been ascertained by physiologists, that all parts of the bodies of all animals undergo an insensible process of renewal. The nails and hair we can see are constantly renewed, as they grow outwardly. The muscles and bones are renewed inwardly, and pass off through the excretions, their place being supplied by matter extracted from the food. This renewal is unfelt by us, still it goes on with great rapidity; and every seven years the whole animal body is renewed, so that not a particle of the old body, blood or bones remain. In young animals the change probably takes place in less time. This fact can be conclusively proved, by an examination of the urine and excretions of any animal, where these chemical compounds may be found; and it is to them the excrements owe their commercial value. I have bred in and in for thirteen years, and my cattle instead of deteriorating, have constantly improved. When young, they receive such food as will insure good constitutions, and their pastures are frequently changed, that they may feed upon different varieties of soil. I am perfectly convinced that the idea so prevalent among breeders, that it is absolutely necessary to change the males, &c., is visionary. But even this may be accomplished without sending to foreign countries, by separating the animals a few miles apart, until the change takes place in their animal economy, and they become renewed in flesh, blood, muscle, sinew and bone; and when again brought together they are different animals in every particular except outward form and color, and are capable of renewing the breed. The same will hold good with regard to the human race. If cousins, for example, are brought up in the same neighborhood, notwithstanding they

change every portion of their original bodies every seven years, may deteriorate by intermarriage, and their progeny become inferior; still, if they were separated for that period of time, and enjoyed a different climate and style of living, their original body as well as their blood having become entirely changed, they might marry with impunity, and without fear of a degenerating issue. I believe in the transmissibility of the properties of parents to their offspring. On this principle all improvements in breeding is founded. "Like produces like." In animals it affects the instincts, disposition and temper. It is one of the fixed laws of nature, that animals should procreate their own species, and the offspring do inherit the organization of the parents; if it were not so the species would not be preserved, and besides, the specific resemblance between parents and children, there is an individual resemblance; the first insures the identity of the progeny, and the second indicates their connection with particular parents. Aristotle names a race of people among whom the tie of marriage was not recognised, and parents were assigned to children from their resemblance to them. Plutarch speaks of a family in Thebes, every member of which was born with a spear head on his body. Haller cites the case of the Bentivoglie family, in whom an external humor was transmitted from father to son, which always enlarged when the atmosphere was damp. Then may be added the Bourbon nose, and Austrian lip. There is nothing in an animal that may not be transmitted by generation, unless a separation takes place for the period named.

This idea puts great power in the stock breeder, who can propagate every desirable property found in a parent, in its offspring. But there is one disturbing fact that I have noticed in my flock of sheep, and that is, if a ewe is crossed when she first comes to maturity by a short-eared buck, she imbibes influences from him that modify her future progeny by other males; and though crossed by one with long-ears three years in succession, she still continued to have short-eared lambs, and a few days since had three, two with long ears, and one with short. This plainly shows that a period of time must elape before we can obtain the desirable properties of both parents in equal combination. Mr. Geron

says, that attempts made in England to improve horses by means of Arabian stallions, have been more successful with mares belonging to no particular race, than with such as do belong to a race. He illustrates the principle by a case which occurred to himself. He supposed that he would more speedily obtain fine wool by crossing Roussillon sheep with Merino rams, than by uniting the Aveyron breed with the same rams; but he was disappointed. The Roussillon race being no doubt more ancient, and possessed of greater poteney than the Aveyron race, offered greater resistance than the latter to the influence of the Merinos; and after twenty-five years of successive crossing, the primitive characters of the Roussillons still appeared, while the crosses of the Aveyron race after the same length of time, could not be distinguished from the Spanish sheep. Proving, that characters long established through many successive generations, give to a race a fixed type. Now if Monsieur Geron had separated these animals even fifty miles apart, for a few years, and then brought them together, or their progeny, he would have accomplished his object immediately. But breeding in the same district, and on the same pastures, the persistency and individuality of the different species, as well as their constitutional tendencies, change, without giving preponderance to either one or the other. Bakewell bred in and in for a number of years, and produced the most brilliant results; his animals were unequalled for early maturity and tendency to fatten, qualities which every stock breeder esteems. They likewise became almost perfect in symmetry; and in 1789 he received twelve hundred guineas for one year's hire of three bucks brought at a birth. I now have a herd producing in some instances six lambs at a birth, and I cannot obtain more than five hundred dollars per pair. Times have changed since Bakewell's day. Experience taught Bakewell, that when his herd had become so far perfected as to show a great tendency to acquire flesh and arrive at maturity early in life, their original enduring constitutions manifested signs of degeneracy. This was the period at which he should have placed a portion of his herd or flocks upon different soils, producing crops containing different proportions of chemical ingredients, change of climate, &c. The animal eco-

nomy being endowed with the power of accommodation, immediately adapts itself to the situation in which we place it. This law is not confined to animals alone, it pervades the entire face of nature, combining all in one harmonious whole, including seeds as well as domestic creatures. Natural processes are controlled by the influence and art of man; all that is necessary is to give the proper direction to his efforts.

Very different modes have been pursued in the improvement of live stock, which may be comprehended under one of the following theories, each of them having in turn been adhered to most pertinaciously. The first, was the in and in system. The second, breeding from individuals of two different offsprings, called cross breeding. And the third, breeding from animals of the same variety, but of different parentage, called breeding in the line. There are many examples of the good effect of cross breeding in the improved herds of swine, horses and cattle in England and America, but this may be carried so far as to produce a degenerate offspring, from the want of that nice care and circumspection necessary to suit the animals to the nature of the desired improvement. I have known injury often to accrue instead of benefit, by the random method adopted by breeders, of uniting animals perfectly dissimilar in their form, size and quality. When it was the fashion here to drive very large horses, mares were put to large studs, which produced an inferior race of animals, with long legs, lank bodies and weak constitutions. If there are any bad qualities in the cross, they are engrafted in the progeny of the original stock, where they remain, if continued in the same soil, for generations.

No man should attempt to improve the animals of a country unless he is willing to incur expense, and operate with great caution, as a mistake in practice will inevitably cause irreparable injury, if extensively pursued. To attempt to improve the Devon cattle in Connecticut, where they have continued for two centuries, and formed constitutions perfectly adapted to the food and climate of that State, by an injudicious cross with some tender foreign herd, would most assuredly produce the injury above alluded to. These animals have gradually accommodated them-

selves to the alterations of food, vicissitudes of climate, and changed their constitutions through successive generations, until their offspring to a great degree have inherited their resemblance, properties and disposition. I would recommend the Connecticut breeder not to propagate from an animal, however excellent he may be, unless he knows him to be well bred, and to have descended from a race of ancestors that have through many generations possessed the desirable properties in the highest degree; and as some males, for reasons not well understood, do not produce offspring possessing their own characteristics, they might always be tried with young females, that their qualities may be ascertained. I am convinced that breeders should by all means avoid a great disparity between the sexes, as the greater the difference between the two, the greater will be the uncertainty of symmetry, feeding qualities, resemblance and dispositions.

The other plan is, to breed in the same line; which is done by selecting animals of the same variety, at the same time avoiding very close affinities. You should never on any account breed from parents having any defect, as it gradually increases in their progeny, and finally materially depreciates the value of the stock. Any departure from these principles by the stock breeder, will lead to disappointment.

It is indispensable that your cattle should have large lungs, as the organs of digestion are subservient to them. This end may be accomplished by selecting well-formed, large-sized females, and crossing them with males somewhat smaller. There are numerous minor matters to be attended to by professional breeders in selecting proper animals for breeding, that an inexperienced person would not consider at all important.

There is another matter connected with stock that I cannot pass over without calling your attention to, and that is, the art of discovering whether your animal is impregnated or not, as it often happens that the sixth month arrives before even a practiced eye can detect pregnancy in a cow or mare. It can be discovered at any time thus: Oil the right hand, and pass it slowly up the vagina to the os uteri, and if it is closed, forming a cup towards the viscus, the animal is not impregnated; but if the cup form

extends towards the vagina, she is impregnated. When born animals become creatures of circumstances and education, we teach them to afford us milk, take on fat, and make flesh; and if males, to receive instruction, and become our willing slaves. By the exertions and management of man, the varieties have become almost innumerable. In Lithuania, the cows are nearly the size of elephants, whereas on the Grampian hills they are but little larger than a goat. These varieties of quality and form have been produced by diversity of climate, soil and human skill. When a farmer possesses a stock of cattle remarkable for combining many fine qualities, he naturally desires them to present one color; and particularly if he is a raiser of horses or mules, he prefers them in pairs. Now you must not be surprised if next season, I reveal to you a method by which you may induce your stock to produce any color you please, and either male or female.

It is a singular fact, that beef and mutton were seldom used by the ancient Romans as food. Pliny recommended that beef, either roasted or taken as broth, should be used as a medicine, but not as an article of diet. In the Latin language there is no word for beef, mutton or veal, and we derive those words from the French. Breeding, fattening or stall feeding cattle for the shambles, was never spoken of by the Roman writers. At one time in Rome it was considered as great a crime to kill an ox as a citizen. Milking qualities were not much regarded, and dairy farming was not at all practiced. The word butter only occurs once in Columella, and then only as a cure for wounds in sheep. Sheep were never fattened in ancient Rome for their flesh; the fleece appeared to be the only object. Even in Spain, at the present day, sheep are raised for their wool only, and seldom eaten, except in cases of necessity.

In fattening animals, I would recommend that they should be kept in moderately lighted stalls, that they may be induced to sleep, as the waste of the system is then much reduced, and the food may be diminished accordingly in quantity; at the same time it is advisable that their diet in the evening should be nutritious and readily assimilated, that their systems may be rapidly repaired, which repair is in proportion to the digestibility of the food, to be

absorbed by the action of veins and lacteals. And as it is all important that the gastric juice should be supplied with hydrochloric acid, and the bile soda, the feeder must not omit to use a small portion of salt every other day in the food, as it yields the requisite products.

A steer four years old will consume nearly two tons of food in a year, and the same amount will be removed from his system, in the same length of time, through the circulating medium of the blood. The muscles, nerves, bones and cartilage, supply themselves from the food, strike a balance, maintain an equilibrium, and give back to nature all they do not require. His corporeal identity is a mere illusion, as one portion is added another is taken away. How can these remarkable peculiarities of beginning growth, nutrition, development, and waste, be explained.

Even the bones which appear so dense and solid, are constantly removed and being added to, continually remodel and adapt themselves to the conditions of the growing creature.

They can be thus explained: All things that live, either vegetable or animal, from the animalcule to man—take their starting point from a capsule or cell, that in many thousands of instances can only be perceived by the most powerful microscope, and if a thousand cells were examined, though each intended to produce a different result and develop the likeness of their individual parents from a tadpole to a man, no difference could be distinguished between them. They both pass through successive metamorphosis; the one reaches maturity, with all the functions of humanity, and the other becomes a frog.

Characteristics are imparted by human parents to their children, such as resemblance of form, feature, figure, gesture, qualities of the mind, &c. And permit me to assure you, that the reason why our present race of men, and women, exhibit so few of the peculiarities that belonged to our progenitors, is, that they lived in an age of great events, and their minds were stored with solid knowledge, their conversations with each other were about the great men of the day in both Hemispheres, and the result was Washington, Webster, Chatham, Pitt, and others too numerous to mention. And now their equals are not to be found in the world

Why, because our men, and women, store their minds with the frivolities of the age—light literature, low theatricals, base politics, and the result is a degenerating issue.

"Like produces like."

Solon Robinson proposed for discussion at the next meeting, "Threshing. Is that done by the flail unthrifty? Where and when is it good husbandry to thresh with machines? And what power is most economical for that purpose?"

By Solon Robinson—"The Grindstone, its uses and abuses."

Members were requested to bring to the Spring weekly meetings of the Club, on every Tuesday at noon, such of their choicest seeds as they can spare, to exchange for others. Such seeds are reliable and are valued, and he who brings only one sort may take several sorts away.

The Club adjourned. H. MEIGS, *Secretary.*

March 9, 1855.

Present—President Pell, Solon Robinson, Asher L. Smith, of Lebanon, Conn., Messrs. Fuller, Livingston, Brower, Pardee, Chambers, Leonard, Dr. Waterbury, Prof. Youmans, Lawton, Dr. Wellington, Dr. Smith, and others—47 in all.

President Pell, in the chair. Henry Meigs, Secretary.

The Secretary called the attention of members to the very interesting discoveries in Southern Africa, recently made by Dr. Livingstone. In the middle of that hitherto unknown region, in South latitude 15° 16′, East longitude, about 23°, on a river running from northwest to southeast at four or five miles an hour, in places 100 miles long and one mile wide, at Katonga, Kaliel, &c., he found extensive districts, rich in vegetation, people and animals occupying villages, which were dotted over it, with gardens cultivated, having several sorts of millet, one with large white grain, sugar cane, Indian corn, sweet potatoes, beans, yams, arum (of which sago is made,) ground nuts, manioc, &c. The people have thousands of cattle, and more milk and butter than they can consume. [Can we say as much of any part of America or Europe? Meigs.]

A noble animal, the elana, abounds; herds of elephants, giraffes, &c.; the lion and hippopotamus are frequent. The heat of summer is very great, and the rain of winter very great. It is not probable that the region will ever be habitable by white men.

The Secretary read a note from Mr. Norcross, of San Francisco, (in reply to his note, requesting seed of the great American tree,) promising to send some to the American Institute.

Solon Robinson—I hold in my hand a letter from E. Miller Stilwell, of Lancaster, Massachusetts, detailing his method of growing celery, which I hope will be interesting at this time to many persons who are anxious to grow this excellent vegetable. The letter reads as follows, so far as it relates to this subject:

I have always succeeded in raising a bountiful crop, free from rust, blight or attack of insects. Celery is a marsh plant, and requires a great deal of moisture. It succeeds remarkably well on black meadow mud, or peat soil; but I have grown it with, or of equal excellence, on sandy loam, but it must be liberally supplied with water. To insure early, and strong and evenly growing plants, the seed should be soaked in warm water, and placed in a warm place, to preserve its temperature, the water to be renewed as often as fermentation threatens, until the seed shows s'gns of germination: the seed is very hard to start, and it is frequently many days before the germ will show itself, a minute speck like the point of a cambric needle. The trenches should be twelve inches in perpendicular depth, twelve inches broad at bottom, and one-third broader, or eighteen inches at top, as this ratio affords such an angle for the sides as obviates covering or washing, and affords the greatest possible amount of rain. The manure used should be well rotted, and perfectly decomposed, so that there is none of the latent heat of fermentation, that is the nursery to insects, from its comparative high temperature to the surrounding soil. Green, unfermented, or fire-fanged manure, will rust celery inevitably and invariably, and no nostrum, not even salt, which is a necessary constituent of the plant, will preserve it, any more than will medicine make a healthy man of him who is daily subjected to the influences of poison. And now for the grand remedy, which is salt, common salt, and which is as necessary to the

healthy growth and perfection of celery as to asparagus, and is the bane of the whole insect and reptile tribe. Strew it upon the manure in the trenches, and spade it in the week before you set your plants; use it with liberal hand in your after culture, strewed upon the earth upon either side of the plants; stir the soil often, for rapid growth, and consequent crispness and tenderness and absence of woody fibre, is the secret of choice celery. After setting your plants, lay a few pieces of lath across your trenches, and place boards upon them to afford shade during the heat of the day, removing them at night. I know of no more valuable manure in a garden, in general application, than salt. Strew it upon your garden in early Spring, until it covers the ground like a fall of snow, and you will destroy myriads of worms, curculios, &c., and much enrich the soil. Neither asparagus or celery, of a healthy growth or correct flavor, can be grown without salt.

Dr. Deck presented a description of a new steam plow, by J. G. Trotter, with drawings, showing the tilling, sowing seeds, liquid manure tank, roller, rake or harrow, feed water to boiler, cutters of soil preceding the diggers, steering apparatus, &c.

Dr. Wellington exhibited Chinese Yams, (Dioscorea Batatas,) twenty-five inches in length, and gave the following account of the culture and quality.

It is important to us to inquire whether the Dioscorea Batatas, cannot be in some measure substituted for the common potato, since that is no longer a healthy or economical food. I think this new root one of the best esculents grown, and that every farmer should introduce its cultivation at once, not only on account of its value for food but because it will be profitable to raise seed for some years, to all who may engage in its culture. The Dioscorea grows in all soils, when not too wet, and yields large roots if planted very early in the Spring, and the manure used, if any, be thoroughly rotted. Of course, where the season is long the roots will have longer to grow, and be larger as they grow the whole season, and until actually frozen into the soil; and when left out over the Winter, start to grow as soon as the frost will permit. Where the season is no longer than at Boston, I find that Mr. J. F. C. Hyde of Newton Centre, Mass., reports that his

crop, specimens of which he exhibited at the Fair at Boston, averaged two and a half lbs. to each root. From the multitude of eyes, and from the fact that seed bulbs can be obtained from the joints of all the leaves, and plants from the small necks of the tubes, it will be easy to multiply the plant rapidly, and still leave the bulb of the roots for food. With the view which I entertain of its value for human food, I know of few ways in which I can do more for human comfort than by urging upon the farmer the value of this root. Its remarkable quality, the ease of its cultivation, its rapid multiplication, its ability to endure our Winters without injury, all commend it to the attention of the agriculturist.

Mr. Fuller, gardener, Brooklyn—I have produced a larger crop per acre, of these yams, than of potatoes, upon the same soil. I can grow a root upon every superficial foot, that is 43,560 plants per acre. I do not think it a gross feeder, or requiring as much manure as potatoes. We find that excellent pies can be made of the dioscorea, and it is much hardier than potatoes when left out over winter, and less liable to injury when exposed to the atmosphere. I plant in rows two feet apart. The old tuber does not grow a second year; it only gives up its substance to nurse the new plant. It may be left in the ground to grow a new crop the second year. The vines are very light, and would grow ten or twelve feet long if trained on a pole.

Threshing.—The subject of threshing was now taken up and discussed, whether it was the most economical to thresh by the flail or machines.

Solon Robinson gave it as his opinion that the use of the flail was not unthrifty, since the straw and chaff could be fed fresh to cattle. Upon the great prairies, it was necessary to use machines, because the grain was out-door, and farmers were in haste to get their grain into market. In a late conversation with George Geddes, a farmer of some note in Onondaga county, he told me that he had tried both methods of threshing, and had fallen back to the old flail. There is another thing in favor of flail-threshing; it enables the farmer to keep a good farm hand over the winter, and give him employment without loss, at least, if without profit.

I am satisfied that a farmer can contract his grain to be threshed with a flail at a less price than he can by machinery.

Mr. Smith, of Conn., thought that it was wasteful of grain to thresh with flails, and for that and several reasons he advocated the almost universal use of threshing machines.

Solon Robinson—I am fully satisfied that there is a much greater percentage of grain wasted in threshing with machines than with flails. Wherever a farmer has barn-room, and is not compelled to hurry his grain into market, and has a stock ot cattle to feed, I am satisfied that it will be found very profitable to employ a man by the month to thresh his grain with a flail, and take care of his stock.

Mr. Meigs—The grain is not lost, the farmer's poultry find it all and fatten upon it.

This subject was still further discussed, and then laid over to be called up at the next meeting, and the subject of manure, and how to preserve it from injury in winter, was taken up.

William Lawton, of New Rochelle, said that he thought that small farmers could not afford to establish all the improvements of barn-cellars and other conveniencies of large farmers, however they may suit large farmers. My own plan is to have my manure-yard well underdrained, and I do not keep the contents covered. I do not find that my manure leaches into the earth, and the contents of the drain go out upon the field, and the yard is dry.

Dr. Wellington strongly advocated barn-cellars, whether for five or fifty cattle, and thought the increased value of the manure would pay the expense of a manure-cellar.

Mr. Smith, of Conn.—I drain my yard into a sort of pond, where it mixes with a rich earth that I dig up and cast out in the spring. I also have a manure-cellar, and think that one load of manure from the cellar is worth as much as two loads from the yard. The latter is only fit for top-dressing of grass land, serving as a sort of mulch. I have brought up my poor farm to be one of the most productive in the State. When I took it, it only kept two cows and a horse. I have no use now for horse-rakes, as the grass grows so heavy that we can pitch it up with-

out any raking. I have produced seven and one-half tons of clover per acre. I keep my orchard constantly in plowed crops, generally potatoes. I find potatoes do not rot where shaded, although they do not yield as much. I am going to plant corn and potatoes upon the same ground, this year. When I used lime, half a bushel, plaster half a bushel, and wood-ashes six bushels per acre, I never had any potato rot, and I intend to try it again.

Dr. Waterbury—The value of any vegetable substance cannot be increased for manuring purposes by feeding it to animals. This is one reason why the barn cellar preserves the manure in a more valuable condition. It keeps it dry; it is preserved just as we preserve our hay. There is no doubt of the plan mentioned by Mr. Lawton, being a valuable one, of underdraining barnyards. It assists to keep the manure in a dry state, and it certainly will add to the comfort of man and beast.

Mr. Solon Robinson alluded to the plan of cultivating clover in Virginia. Clover was thought by the Virginians to be the best and cheapest manure in the world. The clover is sown with the wheat. Cattle are not sent on, or not in numbers to crop it. The plant serves as a mulch, a good warm blanket for the Winter. It is pastured, and in the second Fall it is turned over and corn planted, then subsequently wheat. Nineteen crops of clover had been grown on the land without seed. The clover becomes a fixture, more valuable far than white daisies. When farmers learn that it is not necessary to pass clover through cattle to make manure, they will carry home from New-York clover-seed instead of hauling home colored straw from the stables and fancying it is manure. We might glorify a man for erecting a barn—far better to glorify the man who has no barn nor barnyard, but who manures his land by growing clover.

Mr. Lawton—I have manured potatoes with dry rye straw and with good manure, and with salt hay, in rows, parallel. The manured rows were worth nothing ; the rows with straw, half a crop; the rows with salt hay good.

Mr. Smith—The most economical manuring is to grow a crop on the land. In no other way can land be manured so cheaply as by clover grown and left to decay upon the ground.

Mr. Fuller—Mr. Wilson of Deer Park, L. I., has grown two tons of clover per acre upon what is called the barrens, and he finds that he can grow any other crop after clover.

Solon Robinson—The cheapest manure in the world is clover-seed, and it has been very largely used in Virginia for that purpose upon some of the old, worn-out fields, where the surface was nothing but sand. Lime or guano being first applied, and wheat sown with clover seed, and the first and second crop suffered to decay, the soil becomes enriched, so that any other crop may be grown. If this Club could say or do anything to convince farmers that a crop of clover is the cheapest manure in the world, they would do them a greater service than by any other conceivable means. It is economy to buy manure, but only to get the land in a heart to grow manure. Mr. Smith tells us that clover has become a fixture in his soil. I can corroborate him in that, for I have seen a good crop of clover nineteen years after it was sown, the land having been alternately in corn, wheat and clover without reseeding all that time. Now I believe that it is just as easy to get clover a fixture of the soil as it is to have white daisies; and is there a man who is so foolish as not to prefer clover?

Mr. Pell—The manure we obtain from our animals is a mixture compounded of vegetable and animal substances, such as putrefied straw of numerous varieties of grain, mingled with the excrementitious matters of swine, sheep, horses, and cattle, which mixture loses much by decomposition, and is very far from being equal to the quantity of food made use of by the stock, though many say it is much more. I have weighed the dry food given to an ox, and also the dry resulting fœces, and have found that it only weighed half: 200 lbs. of dry straw produced 100 lbs. of dry manure; 200 lbs. of dry hay, 175 lbs. of dry excrement. Watery food produced less: 200 lbs. of turnips, 15 lbs; 200 lbs. of clover, 20 lbs.; 200 lbs. of potatoes, 30 lbs.; 200 lbs. of oats, 105 lbs.; 200 lbs. of rye, 110 lbs.

Mr. Tierl analyzed the excrements of a horse fed straw, oats and hay, and found that a thousand parts gave:

Water,	698	parts.
Salts,	20	"
Bilious and extractive matter,	17	"
Green matter, albumen and mucus,	63	"
Vegetable fibre and remains of food,	202	"
	1000	"

These are the chief constituents of barn-yard manure retained by most farmers, but the soluble parts they almost invariably permit to be carried to the nearest drain, and thus lose the valuable salts. As it is utterly impossible for manure to putrefy without moisture, this water should by all means be retained in proper tanks, and daily pumped over the dung heaps, if it is inconvenient to have the tanks large enough to contain them, which would be infinitely preferable. It is impossible to value this liquid too highly, as it can be applied immediately to the young plant in such a manner as to produce almost incredible luxuriance. All fertilizers should be placed in the vicinity of germinating seed, to afford it proper nourishment at the earliest period of its growth, thus to enable it to develop its roots and fibres and strengthen its stem and leaves, which absorb the gases and aqueous dews from the atmosphere in enormous quantities. This is shown by the amount exhaled by different plants daily; for example, a cabbage weighing forty pounds, throws off every twenty-four hours, by insensible perspiration, twenty pounds of water. Barn-yard manure is more or less valuable according to the food fed stock. Fattening cattle of course yield the most valuable fertilizers as they are fed upon corn, oil cake, beans, turnips, and ground grains, while lean cattle are fed straw, corn stalks, and occasionally hay, the nourishing principles of which are extracted to build them up, and their excrement is not worth collecting.

Horse dung is one of the most valuable manures we have, if properly taken care of; but I am sorry to say this is not the case with nine farmers out of ten. You will find it accumulating day after day in heaps before their stable doors, exhaling into the air its choice ammoniacal properties, fermenting and heating in the centre until burned to a white powder, in which state it is

called fire-fanged, having lost eighty per cent of its valuable properties. I find manure fit for use when the putrefactive process has been carried just far enough to destroy the germinating principles of the seeds contained in it. In that state it will cover more ground effectually, by one-third, than it will if permitted to become entirely putrefied. To show the superior value of horse manure fed on oats, carrots and hay, over cow manure fed on ground corn, and oats, and hay and turnips, I manured eight acres of oats with horse manure, and an adjoining eight acres with cow manure, so manufactured. The first eight produced more than four times the quantity that the second eight did. The succeeding crops were all equally distinguished for their superior yield on the horse manured portion. I also manured a piece of land containing one acre with the manure of a horse fed on grain, and a contiguous acre with the manure of a horse fed on hay. The result was twice the yield in favor of the well fed horse. Such an animal will consume 72 lbs. of oats, 86 lbs. of hay, and 58 lbs. of cut straw in a week, and the dung and litter will weigh 330 lbs., equal to 17,160 lbs. per annum.

A cow will consume in 24 hours, 82 lbs. of distilled grains, raw turnips, 33 lbs.; hay, 16 lbs.; water, 24 quarts; and will yield 18,250 lbs. of solid manure in a year. Every substance taken into the body of an animal in the shape of food, must make its exit in one of three different shapes. It must be rejected in the liquid or solid excretions, breathed out by the functions of the lungs, or perspires through the pores of the skin. If your cattle have been stall fed on juicy and nutritious food, their manure will be rich and easily decomposed, and though it may not appear to require turning over, still it will be found very advantageous to do so, as the effect will be to ferment the mass equally, and render all parts of the yard susceptible of rapid fermentation. As the excrements of cattle contain in their fresh condition eighty-two per cent of water, and the balance gaseous matters, soda, potash and the salts of lime, which are all found in many plants, the action of these organic compounds depends much more than is generally supposed on their inorganic constituents, restoring to the earth those substances removed by the

roots of grain. A few years since I manured an acre of ground with a mixture of dung and straw, thoroughly rotted, and a contiguous acre with fresh dung and new straw. The first year the first acre produced by far the best crop, but the second and third year the second acre produced the best crop ; the fourth year the two acres yielded alike inferior crops, the manure being exhausted. It is an erroneous idea to suppose that animal or vegetable manures add any warmth to the land when spread thinly over it; but they do attract the gases floating in the atmosphere, which have a tendency to influence the duration of the manure in the soil, and no loss accrues to the farmer ; there being but little heat, there is no fermentation.

But recent manure piled up in the open farm-yard generates heat, and loses weight rapidly; the volatile gases escape the moment fermentation commences, and by the time the mass is half decomposed, the farmer has lost one-half of his manure, in bulk. If you would add organic matter to your land, it would be far better to put on the recent manure, and plow it in, that the products of decay may be absorbed by the soil, rather than waste its valuable properties in the barn-yard. In a single day, horse manure exposed in an open yard to atmospheric influences, will ferment and lose much in weight; therefore the value we assign to it one hour will not apply the next, and if left one week, scarcely one-half of its original weight will remain. Its valuable properties may be retained by an immediate application of charcoal dust, saw-dust, muck, or dilute sulphuric acid. The remedy is cheap and always at hand, but rarely used. Let me, in this connection, inform the stock farmers that the loss they meet with annually in liquid manure, amounts to millions of dollars, and urge them, as I have often done before, to build tanks for its preservation. In Flanders, the liquid derivable from a single cow is valued at ten dollars per annum, but it is in reality worth twenty; containing as it does nine hundred pounds of solid matter, valued at the price of guano, would net that amount. Suppose, then, that there are eight millions of cattle in the United States, and value their liquid at ten dollars each, the price paid in Flanders, it would amount to $80,000,000. The saving of this en-

richer would benefit the nation at large immensely, if some plan could be devised to accomplish it.

The following table shows the quantity of liquids voided by a man, a cow, and a horse, in a year:

					Ammonia.
Man,. 1,500 lbs.,	containing	100 lbs.	of solid matter.		18 lbs.
Horse, 1,400	do	90	do		17 "
Cow,. 13,000	do	900	do		150 "

I would recommend the practical farmer, to pause when about to purchase foreign manure, study the above table, and try to appreciate the immense importance of doing something towards saving these invaluable substances, and at the same time to recollect, that the soil which would yield twice the quantity of seed sown without manure, will produce twelve times with cow's liquid, and thirteen times with human; there is not a single ingredient in either of these liquids, that is not a direct food for plants. They can be equally and systematically diffused through the soil, in such a manner as to become immediately servicable to plants, and it will be found by experiment, that a much smaller quantity than you can possibly imagine, will be ample for all the purposes of vegetation.

A man eats two and a quarter pounds of dry food every day, if he can get it, amounting in a year to 800 lbs., and drinks in the shape of wine, tea, coffee, and water, fifteen hundred pounds, and breathes eight hundred pounds of air. You perceive, therefore, that a man consumes more than three thousand pounds a year—a ton and a half—think of it. And yet a man is chiefly made up of water: for instance, if he weighs 154 lbs., 116 lbs. will be water, and 38 lbs. dry matter; of this 24 lbs. are fat and flesh, and 14 lbs. bone. The chest will contain 200 cubic inches of air, and exhales and inhales every time a man breathes 20 cubic inches, about the bulk of an orange. The fluid exhaled from the lungs and skin every day, of twenty-four hours, amounts to about four pounds, which contains solid animal matter and secretions of the skin; when they remain in the blood they cause various disorders. It is a singular fact, that the body of a man is as warm in mid winter as in the dog days, and that the inhabitants of Africa possess the same temperature of body, that the inhabitants

of New-York do, at all seasons of the year; the heat of mankind is always the same, whatever type or race they belong to, and whether old or young, Hindoo, African, American, or European, rice eater, or beef eater.

It is impossible to estimate heat by the touch; if on entering a room, you place your hand on a marble mantelpiece, it feels cool, and immediately afterwards on a velvet curtain, it feels warm, still they are both precisely of the same temperature, every article in the room, whether stone, wood or iron, if tested by the thermometer, would be found of the same degree of heat. In summer you throw off your flannel, and put on a thin cotton or linen shirt, and consider yourself much cooler—this is an error, because flannel is a worse conductor than cotton or linen. If you wish to preserve ice, you cover it with flannel, and it retards the approach of heat; were you to use linen, it would melt at once.

I have heard men say, that in winter they wear black cloth coats, because black is a conductor of heat; this is true as long as they remain in the sun, but they are cooler the moment they enter the shade. The nearer we approach the sun the colder we become, as may be proved under the equator, where the high mountains are covered with eternal and never melting ice. The sunbeams in bringing heat and light to the earth, pass through an atmosphere hundreds of degrees below zero; still the mean temperature of any place, varies less than a degree, notwithstanding, the winter may be intensely cold, and the summer equally hot. All parts of the world have an average climate. All mankind are hourly changing, notwithstanding the form of each finger nail and scar are apparently as they were in our infancy, still an invisible change takes place of which we are entirely unconscious; every hour a small portion is carried away, and its place supplied. And thus our arms, legs, and bodies, are consigned to the dust, every five or six years, and become what—manure, which enriches a plant, that forms a flower, to feed an animal, whose flesh we eat, and thus during our lives, we may eat ourselves, over and over again. Atmospheric air, which during respiration we draw into our lungs, contains two gallons of carbonic acid gas, in every

five thousand gallons of air. The gluten a man eats repairs the muscles, the oil makes fat, the saline matters bones, and the starch sustains respiration—and the whole makes manure.

As the carbonic acid gas flows from our mouths, upon the respiratory organs of plants, it is immediately absorbed by the little orifices that stud their leaves. One hundred and twenty-two thousand of these, are contained in a single square inch, and the tremendous rapidity with which they act, is so great, that a current of breath cannot pass over them, without being entirely deprived of its carbonic acid gas.

Mr. Meigs—I like one of the questions of the day proposed by Mr. Solon Robinson. That is the "Grindstone." I will now remark that I have found it one of the best hands on the farm or garden. Well used he keeps all tools sharp, so that they can do double the work of dull ones, and better work too.

Subjects for next meeting—same continued, viz: "Threshing," "The Grindstone," and also by Dr. Wellington, "Artificial Light. What shall we use, both for economy, convenience and safety."

The Club adjourned. H. MEIGS, *Secretary*.

March 16, 1858.

Present—Messrs. President Pell, Vail, Olcott, Doughty, of New-Jersey, Livingston, Judge Scoville, Dr. Peck, of Brooklyn, the venerable Benjamin Pike, of New-Jersey, Wagener, Lawton, of New Rochelle, Hon. John D. Ward, of Jersey city, Silliman, Davoll, Dr. Wellington, Solon Robinson, Asher L. Smith, of Lebanon, Conn., Fuller, of Long Island, Dr. Smith, Dr. Waterbury, Professor Nash, Mr. Bruce and daughters, and others—57 members in all.

President Pell in the chair. Henry Meigs, Secretary.

The Secretary read the following papers, prepared by him from the last works received by the Institute, viz:

[Journal of Agriculture, &c., of Scotland, Jan. 1858.]

The mission of our Anglo-Saxon race, evidently is to be the Pioneer of a world-wide civilization, and to act no unimportant

part in fulfilling the destiny at first assigned to man by the Almighty—namely, that of possessing and subduing the earth.

We have not been unmindful of the office thus assigned to us. The British islands have been the seed beds of nations. We are not yet as attentive to agriculture as we ought to be. We hear constantly that agriculture is yet in its infancy, and that of all sciences it is the least advanced. Let us look back to the eloquent Roman, 1,900 years ago. Cicero said "Omnium verum ex quibus aliquid acquiritur, nihil est agricultura melius, nihil uberius, nihil dulcius, nihil homine libero dignius." Of all the things from which we acquire, none is better than agriculture, none is richer and more productive, none more delightful, none of more dignity in a freeman.

St. Hilaire justly remarks, that on more than one point we may still take lessons from Columella and Varro.

The Royal Agricultural Society, of England, sends us Part 2d, No. 40, of Vol. 18, 1857.

It contains seventy pages on the Steppe Murrain or Rinderpest, and concludes that from all that is known about it, it is not at all probable that it will reach England. Horse-shoeing, with fine drawing, occupies twenty-seven pages. Vegetable Physiology, with illustrations of the cellular structure, magnified 400 times, occupies forty-three pages, very instructive, and increases our desire for extensive use of the very greatest magnifying powers for examination of the structures of all bodies.

Lists of Agricultural premiums, among which we distinguish the increasing estimation of poultry, by the high premiums, viz:

Dorkings, best cock and two pullets,	5	sovereigns.
Spanish, best cock and two hens,	5	"
Geese,	4	"
Turkies,	3	"
Cattle, as high as,	30	"

On the manurial properties of clay from gas works.

On the growth of barley by different manures, 77 pages.

For a steam cultivator, 500 sovereigns.

STEAM CULTIVATORS.

At Salisbury, we had four competitors, viz: Mr. Fowler, Mr. Boydell, Mr. Collinson Hall and Mr. J. A. Williams.

The judges decided that on the morning they were to begin working, they should give notice of being ready. They to start from the yard as from the homestead of a farm. Mr. Boydell most triumphantly ascended the hill to the ground laid out for plowing, and fully proved its power as a traction engine. He shortly commenced plowing, but this was not satisfactory, for nothing could keep the plows in the ground! The work he completed, in breaking up the soil with Coleman's large cultivator, was excellent; but this of course, does not comply with the rule for the prize.

Mr. Collinson Hall's engine was unable, through an accident in making a sharp turn, to reach the field in time for the trial. He succeeded eventually in bringing up his engine and making good work.

Mr. Williams' system was anything but satisfactory.

Mr. Fowler after much delay began plowing. The work done was very good, but here we must say, we could not reduce the price per acre below that of the Boxted trials. As far as plowing is concerned, we think Mr. Fowler still stands preeminent over any others. We cannot say that his plows are economical substitutes for the plow or the spade. We vote Mr. Fowler a medal.

THE OX, VERSUS STEAM PLOW.

By H. Meigs.

We have felt enthusiastic, as well as many others, with the prospect of plowing our immense fields with steam-plows, and indeed we had entered into the theory of steam-plows for England, and other well populated districts. We are convinced that we and others were too fast.

From all times past, the ox and the man occupy the farm together. And under no circumstances can it ever be good farming to keep the ox without his labor. The cow rewards us richly with milk, butter and cheese, the calf pays in the market, while

the ox for five or six years works hard on the farm, and while at work does what five men could not do in severe labor, and so he pays the farm full profit besides becoming at the end of his most useful career, the fatted ox, worth to his master one hundred dollars cash, or more.

There is no scheme of farm labor, which can dispense with the ox, for if horses were as plenty and as cheap as cats and dogs, they cannot pay like the ox.

But for our vast prairies, like level seas, steam-plows are as appropriate as steam ships on oceans; and are doubtless practicable, on account of the general uniform texture of their soils, free from stones, roots, and all other impediments to the mechanic steadiness of the steam plow.

LONG ISLAND.

There appeared in a magazine, a few days ago, a renewal of the foolish attacks on the soil of this beautiful island. A committee of nearly 200 gentlemen, of various but most respectable character, including several clergymen of the island, many citizens of advanced age, who had no interest in the matter except to ascertain facts, published their report on this subject in the Transactions of the American Institute, which puts down the old senseless cry of barren Long Island.

The Secretary read an article on the subject from the *Home Journal:*

I was much gratified by a brief article in a late number of the Home Journal, advising the Metropolitan lovers of the rural to secure for residences the innumerable sites upon Long Island. Your sentiments are entirely in consonance with the views I have ever entertained. As a traveler, contemplating the strange contrasts of beauty and deformity, of high culture and utter desolation, which this lovely island presents, I have often wondered that its wastes had not long ago been transformed into the beautiful and cultivated district it is so susceptible of being made. Under the impulses of Flemish art and industry, it would soon become a universal garden and fruitery. Not only the magnificent ridge to which you refer, but the borders of the beautiful

lakes, like Ronkonkoma, and, indeed, almost the entire surface of the island, is adapted to these purposes, and should be occupied by country seats, and pleasure grounds, and the varied embellishments of wealth and taste. The same balmy atmosphere envelops the whole island, it is characterized by the same bland and equable climate, and is, in all its sections, easily accessible by railroad and steamers from New-York and Brooklyn.

Long Island is one of the most lovely and delightful regions of the earth; and it is among the mysteries of human caprices that these qualities have not rendered its whole territory the abode of elegance and affluence. A strange fallacy has consigned thousands of acres to desolation and waste, almost in sight of Trinity steeple, which are capable of the highest culture, and might be converted into remunerative farms and gardens, as well as most attractive residences.

Upon the word of a geologist, and the experience of a farmer and gardener, as well as the evidences afforded by practical results, I aver that nearly the whole area embraced in the territory known as "the barrens," or "plains," is equally adapted to high and profitable culture as the fertile tracts which, for about two centuries, have been the garden spots of the State. The earth is warm and dry, the soil is adapted to improvement; while nature, by the gravelly formation which constitutes the substratum of the whole island, has created a system of under drainage that would require millions of dollars to so thoroughly and efficiently form by art. Besides these attractions, the fact is worthy of consideration, that a small freehold may be purchased on the island at a price which would scarcely command the title of a rocky knoll upon the banks of the Hudson.

It is not the sphere of the Home Journal to discuss this subject in the striking aspect of its political economy, and in reference to the vast importance to your sister cities, of converting these wilds into fruit and vegetable gardens, for the ready and cheap supply of their markets; but it is within your province to urge upon your intellectual and refined readers the allurements of this island as a charming retreat from "the heat and dust of Rome."

Here may be secured quiet and comfort, under the influences of a most salubrious air and delightful climate, and in the enjoyment of the most exquisite beauties of nature. Wave your magic wand, my dear General, over the scene, and you may live to see this lovely, but most unappreciated region, teeming with fruit, glowing beneath abundant harvests, rich in the embellishments of art, and adorned by the villa, the cottage, and alluring pleasure grounds.

A fatuity has taken possession of the popular mind, as to the capabilities and resources of this island, and if you can exorcise it, you will have paid a large installment on that debt which every man owes to his day and generation. X.

Mr. Meigs referred to our Transactions of 1847, containing the report of a committee of highly respectable citizens, (170 in number,) who in a body examined the Long Island lands—barrens and all, and who, at Greenport, met and resolved, "That these lands so long left in a state of nature, are of immense value for tillage for the vine, mulberry, orchards, garden and field productions, and fitted to reward the appropriate investment of money and labor in their good cultivation, to the full extent that can be reasonably desired." Many of the committee were aged gentlemen, well acquainted with Long Island, and many native citizens, who took none of the strange false prejudices of a certain class of people who not only maintain the cry of Barrens, but who contended long and with alarming hostility against the first railroad through those lands, by which other people might see it all in a few hours.

Prof. Nash—His opinion was that Long Island would not pay for cultivation, except upon the old skinning process of surface tillage—that deep plowing would knock the bottom out.

Mr. Peck combated the opinion of the Professor, and showed that these lands called barren are not so.

Prof. Nash—There are more than 100,000 acres of land upon this island that would be worth $200 an acre more than it is now, after expending $100 an acre upon it; yet it is impossible for any poor man to occupy such land, because he could not improve it, and to buy it and attempt it would condemn him to irretrievable poverty.

Dr. Peck—This statement I deny in toto. It is this false statement that has dissuaded people from occupying these lands, and has left them in a wilderness state. The whole wilderness of this country has been settled and made to blossom like the rose by poor men—just such men as could settle and make good homes for themselves upon Long Island.

Solon Robinson contended that Long Island lands were no poorer than those along the Camden and Amboy railroad, which have been made the garden spot of New Jersey, and made so by the labor of poor men. He deprecated this continual attack upon Long Island—this constantly telling poor men not to go to that poverty-stricken region to starve. It was this oft-repeated assertion that the lands are barren which keeps them so ; it is not because they are so, for it has been proved by the most incontestable evidence that these plains, or barrens, as they are called, can be profitably cultivated. He thought it would prove a great blessing to a great many poor men if they should go out upon the island and cultivate it like a garden. It is no use to talk about capitalists undertaking the work of renovation, if they have got to buy the land, and spend a hundred dollars an acre to improve it before they begin to realize a profit. Such men of money are much more likely to spend it in Wall-street speculations. For the improvement of Long Island we must look to the laborers, the hard-working poor men, such as the gentleman, in his old-fogy argument, would discourage from the attempt to better their condition.

Dr. Smith related an interesting anecdote of one of his acquaintances, who proved, in the most practical manner, that a poor man could settle upon these so-called poor Long Island farms, and make a good support for his family, and gain property at the same time. He thought it a disgrace to the country and the age we live in to say that these lands were incapable of improvement except by an expenditure of money so far beyond the reach of all ordinary cultivators that none could be found to undertake the work of improvement.

Several other persons joined in this discussion, which grew very animated, and was listened to with great attention by a large audience.

AGRICULTURAL EDUCATION.

Dr. Wellington read the following paper:

This is a more important question, in its relation to the future prosperity of our country, than any question of tariff or banks, of agriculture or manufactures, of social polity, or even of religion; for it includes them all. A cultivated mind, capable of connected and continuous thought—on the one hand, open to the influxes from heaven, and on the other conversant with the uses of knowledge—*if it be in a healthy and susceptible body*, will work out for itself, aided by divine influx, better systems of commerce and currency, of politics and religion, than it can receive from other men.

But it is of little moment how accurately the mind may perceive, or how well the memory may be stored, if such mind have not a healthy physical organism through which to express itself. In such case it can *never* do its true work, in its relation to external nature and to other men. Wise words may be spoken by men with feeble bodies, but they never have their full effect. Conceptions of immense practical importance daily fall to the ground, like worm-eaten fruit, *unripe*, for want of physical health to perfect and express them.

"*A sound mind in a healthy body*" has long been the admitted need of the practical man; and I would add that it should be "*watered and warmed by the genial influences of a loving heart.*" Our community have been earnest to develop mental power, yet err even here in their method. But the development of physical perfection we have as a people wholly neglected. And this neglect of the body is not more serious than our utter neglect of the true principles of affectional and spiritual development. We have no system or plan for attaining the highest affectional expression, or securing a proper association of the soul with the means of spiritual growth.

The end to be sought, in a system of education, or unfolding of human faculties, should be to *develop* the whole powers of the *man*;—not by any means to find an artist or mechanic, a clergyman or dancing-master, a poet or an agriculturist, but by all means to develop the MAN. We may secure efficiency in an

artist, and not approximate to our highest idea of a complete man. We can place the embryo man under circumstances that will result in making a quite good farmer or mechanic, but he may be yet unblest by the finer and richer qualities of a truly cultivated man. Our whole system of action for the development of boys is an effort for the production of merchants, lawyers, mechanics, or farmers, and perhaps, in some few instances, for the development of peculiar genius, as that of a poet, artist, or inventor. But in the education of girls, if we have *any* object, I have failed to find it.

Certainly we are not educating girls for any profession. We are making no direct practical effort to fit them for wives and mothers. Where is the school from which we may expect a woman to graduate, thoroughly developed in all her faculties, even if she have time and means to pursue such an end? The schools are far too few where we can find females properly and harmoniously developed in the intellect alone. No one pretends to claim that there are any schools where girls are properly developed physically. There are no schools where girls with feeble bodies, curved spines, and slender constitutions, are made stronger. But there are scores where the beautiful symmetry of the female form is marred and distorted, where the voice is robbed of its sweetness, and the soul of its best expression.

Much has been said in different parts of our country about the importance of "Agricultural Schools," and the instruction of farmers in the science of agriculture. Inasmuch as I believe that the great desideratum is integral education, which shall leave no faculty uncultivated, but which shall unfold the complete man or woman, I have no faith in schools for specialities. Agricultural and music schools—boys' schools and girls' schools—dancing and drawing schools—I believe all are to give place to those where cultivation in all of these shall be secured to every pupil. The age is beginning even now to demand, or rather to desire, a full and complete education for each individual. But at the present time I know of no single institution where all the powers of each individual may have full development. I know of few where there is any attempt to do more than discipline the mind and store the memory with facts.

I wish therefore to explain the way by which I would secure a good practical agricultural education to every pupil of both sexes. I believe this may be done, while at the same time the development and culture of the intellect and the heart may be promoted. But it must form part of a *system* of integral education, in harmony with the peculiar genius of the individual, yet where every power of the soul is cultivated. In this system, physical culture must receive the first attention. And this physical culture must aim at more than we usually seek. Not only must we desire a body without pain, but we must seek absolute health—ease and grace of motion—symmetry of form—manly strength, and the most dexterous use of all the faculties.

As we pass through New England in summer, we see the territory about the school house walled out into miniature farms—miniature wells are dug, and sometimes stoned—roads are built—barns, representing the highest practical idea of the boy or girl builder—toy orchards and symbolic gardens.

Now these do not occur in a few solitary and peculiar cases only. The country schools where such things are not found are the exceptions. What mean these spontaneous expressions of childhood. Whence come those stone walls, reared by the same hands that refuse to cull the stones from the potato patch and barley field at home? It is the effort of these unfolding minds to express their own ideas. I would rather say, it is the struggle of the inspirations from heaven to be voluntarily ultimated through each of those individual human organizations. These rude efforts are appeals from heaven to you and to me to afford opportunities where the growing mind may express with facility and in beautiful relations its highest conceptions—those which so press for ultimation that, under the most adverse circumstances, and with the rudest material, they must take some form.

I would take advantage of this willingness of each mind to express its own thoughts, even in forms of labor which would otherwise be drudgery, and would afford facilities for it to give *its* own highest ideas, which it is always a pleasure for *any mind* to express. This must be the free expression of the mind of the pupil—not an exercise prescribed by another mind, whether teacher or parent. To secure the most efficient action and development of

any mind, it must have periods when it can fully express that which affords it most pleasure, and express this in its own way. It must also have facilities for the *best* expression.

It does a pupil *some* good to play farm by the roadside, with pieces of rail and straggling rock, with miniature trees from pine boughs. It does the girl *some* good to play house-keeping with fragments of china, chairs made of chips, and rag-babies. How they will struggle to give some idea of house-keeping with the rudest materials! But put into the hands of little girls dolls of symmetrical figure, with facilities for dressing them; furnish them with toy-tables, miniature plates, cups, &c., perfect in form; give them a room that can be divided into apartments; and afford facilities to aid them in expressing their best idea of domestic life, occasionally quickening their minds by some thoughts of your own, or a word of approval, and they will certainly be benefited; their minds will be strengthened and made more practical.

If a similar course is pursued with both sexes, in affording facilities for expressing their best ideas of a garden, the opportunity will be welcomed with even more enthusiasm, and greater and better results would follow. I have remarked before, that I would consider physical development and perfection the first thing to be secured. I consider gardening one of the best means of securing this. I would therefore have certain hours when I would require all pupils to work in the garden for health. A knowledge of chemistry, botany and agriculture, is useful and important to all persons. Such knowledge I would make it a point to communicate during these hours of required labor and study in the garden; and should regard it one of the most important exercises in which either sex can be engaged. During the hours so appropriated, I would have each pupil of both sexes put into the ground at the proper time the seeds of every plant used in the family. I would have every pupil of the school transplant each a cabbage on the same day; another day, let each transplant lettuce, summer-savory, egg-plant, &c., &c. The daily and weekly compositions of such a school I would have consist of minute records of all the treatment of these seeds and plants—times of planting, hoeing, manuring and watering, the manner in which they were harvested, with reasons for trying any original methods, and authorities for any ideas adopted from others.

I maintain that in proportion as you develop the ability and skill of such pupils, and in proportion as you secure physical strength and a dexterous use of the physical faculties, and afford the mind facilities for receiving its appropriate food, you make it certain that such mind will yearn for its model farm, its model family or workshop. But in proportion as you refine and dignify and develop the mind, you must improve the opportunities for the expression of the model thoughts of the future man. Refine the tastes of a girl six, eight or ten years old, and she wants something more than a bundle of rags for a doll, with a charcoal sketch for a face. That is not and cannot be her baby. Nor can piles of broken crockery be her cupboard. Teach the boy of ten, agricultural chemistry and botany, and he will not be satisfied with roadside gardens and sand flower-beds, but he will demand grounds, trenched and subsoiled, manured and watered. Nothing else affords a chance to express his thought. Give him these, and he will express thoughts of which older minds might well be proud.

But it will be asked, How much of such instruction can form a part of an ordinary school education? It will be insisted that teachers cannot have time to take all the amusements of children under their supervision. This will never be necessary. In the organization of my ideal school, I should allot much less time to the study of the languages and the sciences than is now given to them; yet I should expect to secure much greater proficiency in each of these. All my efforts would be to feed each mind with the food which that particular mind needs to live out its own spirit-life. I would never make any mind a store-house for other people's thoughts, or a pack-horse to drag off either the rubbish or the treasures of other minds.

If the body is made healthy, strong and active, and the mind is accustomed to use all the information it gains in ways that are attractive to the child, and never required to bear a burden of words, simply because a parent or teacher thinks best, there will be more acquired in two hours than in six, as the time is now spent, with such minds as we now have, and in bodies so deficient in energy.

Physical amusements then must first be systematized. Dancing, marching, and other exercises which are regulated by music, must form a prominent part in the amusements of the school. But they must never be pushed to satiety. Always arrest the most attractive pleasures when the mind yearns for more. With this caution, the minds of youth will be harmonized by the music, methodized by the regularity of the movements and the order of association. They will be enlivened by the cheerfulness with which all would engage, quickened by the dexterity required, and led to grace and elegance in the motions of the body, and to a great extent in the emotions of the soul.

But the mind would tire of dancing and music, of painting and flowers, of the most attractive pleasures, unless relieved. Watch then for the first expression of a change of sentiment in this community of child-life, and in whatever direction it tends, carry it to the highest perfection, and to the most beautiful and philosophical expressions.

To illustrate: if the kite becomes a matter of special interest, teach the philosophy and mechanics involved in flying a kite—the proper adjustment of the line and the tail—furnish the best materials for making elegant kites, and encourage skill in making them large and of fanciful forms. Then give instances of the use of the kite, where it has been the means of conveying a line across a stream to prepare for a suspension bridge—narrate the feat of the sailors, who, by flying a kite over Pompey's pillar, thus carried over a line, and then all ascended to the top. And lastly, state the valuable aid it afforded to Dr. Franklin, and through him to science.

I would thus invest all the sports of childhood with every possible influence which shall tend to perfect those who engage in them, bringing into use all natural genius and acquired knowledge, and increasing the pleasure in them, in order to give the mind both instruction and enthusiasm. Then, in the department of agriculture, I would afford every inducement calculated to delight the mind, and lead it to select this as a favorite amusement; and would press the required duties as far as the interest could possibly be carried.

On the importance of this, or something like this effort to secure physical health and strength, many are fully in harmony with me.

But it is not for purposes of physical exercise merely that I urge gardening, nor yet for the acquisition of agricultural or botanical knowledge, nor for the cultivation of taste—but for an end, to me, greater than all these.

I think I have demonstrated, in my past medical experience, that man is constantly receiving magnetic currents from the earth, unless their passage is intercepted by substances through which these currents cannot pass—as is done by India rubber shoes, which interrupt the flow of the vital fluid from the earth, and thus cause the feet to perspire, not in consequence of heating them, but of deranging the vital circulation, by cutting off the continual supply from the earth. The vital currents are up the legs; and the less there is to impede their flow, the more vital power. The boy who brings his bare feet in contact with his mother earth receives freely from her generous bosom currents equally as important to his full development and health as are the more material fluids of her who bore him.

As soon as I had fully demonstrated this to my own satisfaction, I began to apply it in my medical practice. During the warm summer mouths I would endeavor to bring the whole surface of the bodies of feeble invalids in contact with fresh-turned earth. Some of the most feeble cases of children among my own patients, and some who came into my hands, when given over to die by another physician, I have laid carefully on the warm bosom of mother earth, and gently rubbed the little body with the soft fresh soil; and in no single instance without success in affording relief and securing a cure. And the more earnestly it should be urged upon me that a sick child of mine could not survive, if it was during the warm weather of summer, the more certainly would I put it where it could have the best flow of the magnetic virtues of the earth into every part of its feeble and dying body.

I do not need to draw the argument from this in favor of agriculture for schools, or to dwell upon the advantages of exercise in gardening for pupils of both sexes who desire good health. With the elasticity of body and energy of mind that may thus be secured, it will be found that the child, instead of requiring to be driven by fear of punishment to commit a certain number of lines

and pages, would need to be restrained from too much use of books. Instead of taking months to master a rudimental text-book, it would be done in a few weeks and with much less confinement each day—for all that would be undertaken would be entered upon with the energy of positive desire. This is not merely theory or speculation. In a great measure I speak what I do know, and testify what I have seen.

I anticipate the ready utterance of the conservative mind, that children will not take sufficient interest in the garden to lead them to make the necessary effort, and that it will entice them from their books. I grant that it will entice them from their books in a measure; but only as they come into habits of active and vigorous thought. Having tried the experiment partially, when my own ideas were crude, immature, and without plan, I aver that the voluntary use of books will be far greater than in ordinary schools.

As to the interest they would take in the garden, my own experience establishes the conviction that they would all rejoice to labor if the garden was made sufficiently attractive. Twenty years ago, when my own views began to take form in this direction, I erected a seminary, and surrounded it on every side with flowers. For four years, these flowers were loved and cherished by a school of from thirty-five to fifty pupils, and in no single instance, to my knowledge, was any theft committed by the children, or did any serious injury result from carelessness or play. And though this was my garden, and not the students' own, they would not only tender their services, morning and evening, to keep it in order, but on Saturday afternoons they would vie with each other in efforts to put it in perfect trim for Sunday. As the garden fronted the church common, the grass borders of the side-walk were regularly trimmed, and the whole carriage path smoothed and raked over each Saturday afternoon for years, by the voluntary efforts of city boys.

The subject of the day was now called up, viz:

THE GRINDSTONE—ITS USES AND ABUSES.

Solon Robinson—Mr. President, I rise to a question of privilege. I believe that is the term for which greater men than I claim the

privilege of speaking in greater assemblages than this. It is a question of personal privilege. It was my privilege to introduce the grindstone question; it was yours to fix a time for its discussion; but you have taken away that privilege and devoted the time to other purposes, and here I am with an ax to grind and nobody to turn. Besides, I have been poohed at for introducing this subject, and the question has been rather sneeringly asked, "What can you say at all interesting about a grindstone?"

Now, I came to-day prepared to let you know what I could say, and yet the grindstone wouldn't go. I have not had my say. What shall I do?

Several voices—"Go on! go on! hear him! hear him! Let's have a turn at the grindstone!"

Mr. Robinson—Very well, then, I say this: The grindstone is not such an unimportant subject of discussion by a farmers' club as some persons, without reflection, may think. What could a farmer do without it? In fact, it is, instead of being unimportant, the most important implement ever brought upon a farm. Show me a farmer that does not own a grindstone, and I will prove to you by a thousand witnesses, if any other is needed, out of his own mouth, and upon his own farm, that he is a poor, shiftless, thriftless fellow. Pray, tell me what more pitiable thing, what more derogatory to his character and ability to live like a man among men, could you say of one who claims the name of farmer as the justly proud prefix to his own cognomen, than to say, "Poor fellow, he has got no grindstone?" Some person has said that he could measure civilization by the quantity of soap used. I can measure it by a better test—it is the grindstone test. When I was an early settler, so early that I had no white neighbors, in the north west county of Indiana, and no customers for merchandise but the wild Potawatamie Indians, who were a very dirty, uncivilized tribe, the last, you would think, ever to wash themselves, I sold them a bar of soap, but never a grindstone. At a later period I had a good many white customers, civilized ones, as was proved by the fact that, while I was selling one box of soap, I sold a whole wagon load of grindstones. These were sharp customers; they bought the means to sharpen their axes,

chopped their own wood and burnt it upon their own hearth-stones, and made their own soap. Soap may be an evidence of civilization, it is not a certain one, but the grindstone test never failed. Neither did it ever fail in the proof of a good farmer. If his grindstone is all right, so is everything else. If it is an old shackling affair, hung with a loose wooden shaft, and rotten crank, with a limb of an apple tree for a handle, upon a frame propped up, one corner on a dilapidated stone wall, without a trough to hold water, and with a wo-begone squeak and a groan when it is put upon duty, you need not look any further after that man's character. He will grind it out for you, if you will turn, upon that miserable excuse for a grindstone. Do you happen to know a fellow who is notoriously a poor, miserable, slack, go-day-come-day, slow-and-easy sort of a nobody, you may set it down as gospel truth that he don't own a grindstone—not even that miserable excuse for one mounted upon the dilapidated frame that leans against the old stone wall; no, not even one that runs upon notches cut in two fence-rails leaned against the back side of the house, or rested across the corner of the pig-pen, the fac-simile of which you can find in a thousand hills and vales throughout this land of civilization, fourth of July patriotism and grindstones. Talk about your mowing and reaping machines, your sharp scythes, and keen axes! Not one of them could be made or kept in order without the grindstone. Tell the farmer about the advantage of sharp spades and hoes, but how is he to keep them sharp without this most indispensable of all implements of husbandry, the grindstone? Talk about the discomforts of a smoky house and a scolding wife! That is not the real cause of the scolding, it is a dull axe. You don't pitch into that hard-seasoned old log that contains some of the best fuel in the world, but go to work like an uncivilized Potawatamie, and knock up some old rotten wood with your dull axe; and that, instead of making a fire makes a smoke, which sours the good wife's temper, which finally, if the wood does not, bursts into a flame when she attempts, with a dull knife, to cut meat for the breakfast of a poor, shiftless, good-for-nothing fellow, who is trying to live in the world without a grindstone. Think of it, living without a

grindstone! You have all heard of that figure of speach, grinding the face of the poor. It ought to be made a reality upon every poor devil who keeps such a grindstone as I have described, upon his premises. I would grind him until his wits were sharpened sufficient to make him get a better grindstone. There is another old saw—holding his nose to the grindstone. I can almost feel the scab on mine now, from the early and cruel holding of it, when I was a boy, over one of those hard-hearted grindstones that are only owned by hard-hearted men, because they will stand an immense amount of turning without wearing away. It is no matter that they wear away the soul of the boy at the crank, he is a hired boy and what business has a hired boy to have a soul? And if he has, it was hired to wear away, while the grindstone costs money. So does the time that is wasted, but the old fogy that owns the grindstone has not soul enough to appreciate that, and so year after year he wears away the precious jewel upon his miserable old hard-hearted grindstone. Will men ever learn what an abuse this is of a good thing? Will farmers allow me to press upon them to think that they never had, never can have upon the farm, a piece of machinery of so much importance, one that pays so great a percentage upon its cost, as a first rate grindstone. A grindstone, did I say? I might say a dozen, for there are many farms where it would be the height of economy to own a dozen, of various shapes and sizes, of various qualities, adapted to various purposes; some stationary, and some portable; some driven by steam, water, horse or dog power; some turned by hand, and some rigged with a treadle so as to be turned by the foot; but no one, great or small, should ever be hung upon a wooden shaft, or even give a squeak when turned. In fact, the grindstone should be kept as well tuned as the piano; and no piece of machinery should be made to run smoother, and none ever did run smoother than a stone well hung upon well oiled friction rollers, just such a one as every good farmer has already, or will have, as soon as he reads this discussion upon the uses and abuses of the grindstone.

Mr. Meigs highly valued the observations of Mr. Robinson on the grindstone. He had always found that his own spades and

hoes, made of steel of the temper of the common trowel, whose edge will not turn on striking flint, and which were perfectly polished and ground sharp, did twice as much work in a day and better work than our common half rusty iron ones. I have worn out such implements with my own labor. I have dug two spades deep and raked into beds 2,600 square feet of garden in one day, without being overfatigued. I found it unnecessary to use the foot to drive down such a spade. Its fine edge and polish entered full length by the ordinary power of the hands, and that polish prevented soil &c., from adhering to and clogging it. So with the hoe; its sharp edge cuts the stalks or roots of all weeds and killed them, while our common rusty iron hoe merely lugs them out of ground, and they often survive that clumsy method and take root again, as every gardener and farmer well knows.

I therefore declare, from my long experience, that a good grindstone, fairly turned, to keep all implements bright and sharp, is fully equal to one able bodied man on the farm, or about (wages, board and all,) five hundred dollars a year. Our Solon, in this excellent sketch of its worth, has rendered a service fully equal to that of the famous lawgiver of Greece, who was once a small merchant, but loving science better, used his mercantile wealth to obtain wisdom. His great saying remains as perfectly true as our Solon's uses and abuses of the grindstone. "Laws are cobwebs to catch the weak, while the strong break through them, and he that can't obey can't command!"

Mr. George C. Barney, recently from Yucatan, presented some peculiar dye seeds, (red,) from a shrub like the lilac; also arrow roots from the island of Cosumel, of Yucatan.

Mr. Fuller, of Long Island, presented pies made out of some of his crop of Dioscorea Batatas. The root cooked by simple boiling, was also introduced by Dr. Wellington, tested and approved as good food.

Mr. A. O. Moore, of 140 Fulton street, presented a number of packets of Imphee seeds of ten varieties, enumerated in Olcott's recent work on the "Sorgho and Imphee." It is estimated that some of these may yield over five thousand pounds weight of sugar per acre.

Mr. Pease presented a quantity of wax beans, grown here by his brother, from seed from Germany. They are shining black and reputed a very good variety.

Mr. Fuller presented a parcel of the Bulbilles of Dioscorea Batatas, of which he has raised a large crop. These little balls grow at the feet of the leaf stalks.

Subjects for next meeting. Those of last meeting, and "The best forms, &c. of public markets," by Dr. Holton; "Vineyards" and "To what extent and by what means can agriculture be taught in any schools with advantage? and what are some of the best results to be sought?"

The Club adjourned. H. MEIGS, *Secretary.*

March 23, 1858.

Present—Messrs. President Pell, Hon. R. S. Livingston, Mr. Livingston, Leonard Wray, of England, Asher L. Smith, of Lebanon, Conn., Solon Robinson, Dr. Holton, the venerable Benjamin Pike, of Jersey, Fuller, of Williamsburg, Paine, T. W. Field and Dr. Peck, of Brooklyn, Dr. Underhill, of Croton Point, Wagener, Adrian Bergen, of Gowanus, Prof. J. J. Mapes, Prof. Nash, Mr. Bruce and two daughters, Dr. Smith, W. Silliman, Mr. Troye, of Alabama, Mr. Vail, Mr. Pardee, Mr. Geissenhainer, and others—about 80 members.

President Pell in the chair. Henry Meigs, Secretary.

The Secretary read the following translation made by him:

[Bulletin Mensuel de la Societe Imperiale Zoologique d'Acclimatation, January, 1858.]

We translate from this number, an article on the domestication of the ostrich. If successful, and the noble bird becomes plentiful, what a dish will be served up, of a pair of them on the table at a great civic festival?

Mons. Chagot offers to the society, a prize of two thousand francs for their domestication. Six ostriches of the third generation domesticated, shall have it, whether raised in France, Senegal, or Algeria.

We have for the first time since the flood, tried camels in America successfully. Let some enterprising American give us flocks of ostriches. Their feathers will well pay for their keeping.

How to make good soil out of bad at the least cost: by H. Meigs.

If your land is sandy and poor, dig or plow it as deep as you can—two feet is little enongh. Save all the urine and night soil, soot, ashes, soap suds, all bits of wood, twigs, weeds, cloth, woolens, leather, bones, hog manure, hen and pigeon dung, cow and horse dung; procure a little good soil to mix with these omnium materials; mix them perfectly; make a conical heap of them, and a crater in its top; put in some quicklime, pour on as much rain water as will suffice to moisten the heap, carrying down with it the lime in solution. Let the heap rest until it has undergone a good heat from its own fermentation! Prepare trenches for rows of peas, beans and the like—put into the bottom of the trench a thin layer of this compost and cover it with an inch thick layer of the soil or sand, as it is; on this layer plant the seeds at right spaces, and cover them not over two inches deep, with the soil or sand, and press the surface moderately. I have found such culture, especially fine for tomatoes, peas, beans, and when separate hills are formed, canteloupe melons have especially flourished.

It is true that in my practice I gather all weeds, branches, bones, animals, &c., within my reach. My loose light sand became a rich brown mould within six years. I did not pay one cent for manure in the whole restoration of the land. As soon as plants grew in it I put back into it every straw, leaf, cabbage stalk, pea and bean vines, pods, husks, stalks, &c., burying them all in the ground. And I found the two feet deep tillage best for a very dry time—my corn, &c., stood the drought best.

If your land has too much clay, or has like parts of Jersey hard pan, you must put on plenty of sand and mix it up with the soil as perfectly as forks, or plows and harrows can do it.

The depth of this tillage ought to be as nearly two feet as possible. A knowing gardener makes all the soil for his special plants in pots and boxes. He sifts first, one item, say sand, as much as he judges enough, then clay over that; some lime; some guano; some salt; some other ingredient. He then stirs the whole together thoroughly, as a good cook does her buckwheat batter. He then sifts the whole so that finally he has a particle of sand, one of clay, one of guano, one of lime, one of bone

dust, &c., &c., &c., in intimate connection, so that the little wet dog nosed rootlet, the spongiole, (little wet sponge), can find readily what it seeks for, its food, and so flourishes early, as the young do on the wonderful Pabulum mother's milk.

As soon as this infant plant has then drawn its growth from its mother's milk, it then expands to the sun, the air, the breeze, the dew, the rain, the electricity. It breathes! It is warmed by the solar ray; it is colored by it. It drinks dew and rain. Its pointed leaves play with the electricity in thunder storms. It sleeps under the faint cool light of the moon. It lives its proper and perfect life.

This education of the land and the plant go on rapidly multiplying, and a good farmer who began on a bit of sand his little garden, can see at his own perfect manhood, a farm of the highest value grow out of it.

On the contrary, plant grain and tobacco on millions of acres of rich land in the finest climates and latitudes, take all off annually, put nothing on, and you may look on a hundred acre field which bears not a wheelbarrow load of crop or even of weeds. Such devastating farming was seen in our noble land! John Taylor, of Carolina, and his worthy knights of the soil, killed many of the devastators. They grew thirty bushels of wheat an acre where thirty melancholy mullen stalks could hardly live and grow eighteen inches high.

We call our plan by the common name, economy, whose true meaning is, the law of the house. That law commands the saving and application of all that belongs to the house, to its own support. It commands the soap suds of every Monday's washing to be carefully saved for manure, &c.

The secretary read his translation of a letter from Mr. Humboldt, directed to our late president, Tallmadge, of whose decease the Baron was not aware.

Berlin, February 25, 1858.

Mr. President—Through the kindness of His Excellency, Mr. Wright, the respectable Minister of the United States, at Berlin, I have received the interesting volumes of the annual Transactions of the American Institute, of the city of New-York. And

I beg, Mr. President, of that noble and patriotic Institution, to accept the assurance of the gratitude I feel for the honor done to me by this benevolent recollection of me. Devoted, as I am to the interests of your beautiful and powerful country, ever since the time of Jefferson, I feel sensibly this mark of your remembrance of me. Condescend to accept kindly this assurance from an old man, almost an ante-diluvian, of the homage, respect and gratitude of your very humble and very obedient servant,

A. L. HUMBOLDT.

FARM BUILDINGS.

Mr. Pell—In the construction of farm houses, and other buildings necessary for the economical and advantageous management of farms, too little attention seems hitherto to have been paid, considering the great practical importance of such objects. It is obvious, that the facility and convenience of carrying on different operations must greatly depend on the judicious form and arrangement of such erections. By the commodious distribution of such buildings, servants are enabled to perform more labor, and with greater ease to themselves, or where offices are injudiciously placed, much of their time must, of necessity, be lost to the conveyance of different articles, such as hay, straw, &c., from one place to another.

The size of farm buildings should in general be proportioned in some measure to that of the farm, and their construction regulated by its nature and situation. Where the farm is merely a grazing one, fewer buildings are required, and these are chiefly of the shed kind, which may be formed in a cheap manner, of such materials as are nearest at hand, or can be easily procured. In such cases the sheds should always have permanent roofs, except they are built in the field for summer only. For dairy farms composed of grazing and arable land, cow houses should be so arranged as to suit the number of cows that can at any time be kept; and such other conveniences should be provided as are proper for the dairy business, whether they be managed as cheese, butter, milk, or suckling farms; for such farms small stables and barns are in general sufficient. And for the arable or corn farm, as partaking in general of both the other sorts, the offices and

buildings should not only be much more numerous, but calculated to suit the various purposes of each. The stables should be sufficiently large and convenient for the accommodation of such a number of horses as may at any time be employed in the labor of the farm; and the cow and feeding houses adapted to the quantity and kind of cattle kept or fed.

The barn and granary must also be proportioned to the extent of ground under arable cultivation. Where thrashing machines are to be erected, the size of the barns need not be so great as in other cases; as neither the height necessary for the flail, nor room for a large quantity of grain in the straw, are required. On this kind of farm convenient buildings should be prepared for the breeding and management of young animals, such as horses, hogs, cattle and poultry.

The dimensions of the farm house, like most of the other buildings, should in a great measure, be regulated by the extent of the farm. It should be neat, airy, and have sufficient accommodations both for the family of the farmer, and the business that is to be performed in it. On the ground floor there ought to be a good parlor and kitchen, with a back kitchen, which may serve as a bake house, with closets and other convenient places for depositing different articles; and likewise a dairy, pantry and cellar.

The upper part may be divided into lodging rooms, of good size, in order that the air may be unrestrained. It will also be well to have a complete system of drainage carried out before the foundations are laid, as locations often have the name of being unhealthy, when it is entirely owing to the construction of the house. Hip roofs with vents within the building, are as cheap as gable ends, and much to be preferred. The thickness of the walls must depend on the convenience of procuring materials. Where rough stone walls are made, the thickness may be two feet. If bricks are used they may be thinner, but thin houses are readily penetrated by heat in summer, and cold in winter. In constructing houses for the purposes of farming, considerable latitude must be given; but, as architectural ornaments are not much wanted, the principal points to be

attended to are to provide sufficient conveniences, without incurring great expense. Such buildings should be cheap and simple in their form, and have a regularity of appearance.

Barns may be from twenty to forty feet wide, with height and length proportioned to the quantity of materials that are to be stowed. Air should likewise be freely admitted into them on different sides, by means of slides or other contrivances. The construction of the floors must be particularly attended to, in order that they may be firm and dry. When made of plank, they can be laid on a foundation of brick or stone this makes them secure and free from damp. Well tempered bricks laid edgeways make a good floor. Where the situation of the ground will permit, cow houses and other similar offices may be on the ground floor, and the hay lofts above. Barns must be so arranged that loads of grain or hay may be drawn on the barn floor, which expedites unloading nearly two loads to one.

Granaries should be strongly built, and sufficiently large for the reception of one-half of the annual produce of the farm. In the construction and fitting up stables for farm horses, it is not necessary to attend particularly to elegance. It is sufficient to provide them comfortable and convenient habitations, well ventilated, perfectly clean, and thoroughly drained. In regard to the mangers and racks, they should not be particularly spacious, as servants are apt to fill them with hay no matter how large they may be; from which bad consequences ensue; much hay is pulled down and trodden under foot, besides injuring the horses by permitting them continually to stuff themselves with hay. They should never have more in their racks than they will eat clean. Racks should never incline far outward, as the seeds are not only wasted but very apt to fall into the horses' eyes and ears, producing disagreeable effects. Mine are perpendicular, all moving on a pivot with a grate beneath, and boxes under to catch the seed. Racks of this sort may be placed before nitches in the middle of the stalls, or in the corners or angles.

It is also unnecessary to make the manger the same width as the stalls, as a drawer eighteen inches long and fourteen inches wide, will answer the purpose. It may readily be taken out

and cleaned, which is a great advantage. With fast mangers this cannot be done. Fixed mangers are often daubed by the saliva issuing from the horse's mouth during the time of feeding; or the discharges proceeding from his nostrils when laboring under colds, or other more dangerous disorders. A better method is to make boxes ten feet square, with neither racks or mangers. The head is boarded about three feet from the ground, having a space about two feet from the wall, in which the hay is to be deposited, the horse pulling his hay from below instead of drawing it from above; which is not only more natural but prevents waste of hay. Whatever falls is received among that from which it was taken. A drawer may be contrived to receive the oats. The bottom of this box should be level, as it is obvious if it slopes as is the usual mode, that the tendons, or sinews of the pastern joints must be kept constantly stretched. It may be kept dry by paving, leaving a small drain in the middle, extending within a foot of the upper end of the box. This drain may be from four to six inches deep, and covered with a strong oak plank bored full of holes; so arranged that it may be lifted at pleasure, and the drain cleaned. The pavement may have a declination from their sides towards the drains of about an inch, which will prevent moisture standing upon them, and thus save litter and prevent disorders in the feet and heels of the horses. Contiguous to the boxes, a place should be provided for the reception of harness and other kindred matters. The oat-bin should be so constructed above, that the proper feed may be regulated and received from a spout in the different mangers. The principal points to be attended to in the construction of cow stables is that they be capable of free and easy ventilation; that they require little labor in administering the food and cleaning away the excrement; and that the stalls be so contrived as to keep the cattle perfectly dry, airy and cool. And have convenient and suitable drains and reservoirs for the reception of excrementitious matters. Unless cow stables are thoroughly ventilated, the animals are liable to be disordered by the condensed perspiration and fumes arising from their respiration, as well as from cold proceeding from the quick evaporation that takes place in

such cases. In this way cattle are frequently prevented from fattening so expeditiously as they otherwise would do. Double sheds are unquestionably the most proper, economical and convenient buildings. Make the cattle face one another, and leave a space of four or five feet for the person who feeds them, to pass with his barrow.

Before each cow there should be a trough for feed, and a convenience for holding water, which may be filled by means of a pipe from a cistern or well. The boxes for water may be made of wood or stone. Above these may be placed a perpendicular rack for hay. Calf pens should not be placed in the cow shed. The floors must be laid in such a manner as to keep the animals dry and warm.

Dairy buildings should have three apartments, a milk room, churning room, in which there should be a proper boiler, and other conveniencies for scalding and washing the vessels, and a place for drying and keeping them in, when they cannot be put out of doors. The cheese dairy may also consist of the same number of rooms, namely: the milk room, the scalding and pressing room, and the salting room. A proper temperature is of great importance in a dairy. The situation must not be exposed to too much heat from the sun in summer, or the coldness of the air in winter. A northern exposure shaded by trees, and where the sun has no influence, is the best.

Farm sheds are extremely convenient and proper for various purposes of the farm. They are cheap and simple in their construction, and can be erected without much labor. They are commonly made so as to lean against the walls, or other part of buildings, the lower part being supported by wooden posts, or stone pillars. In these may be preserved all the larger sorts of farming implements from the effects of the weather, as well as for the protection of young animals, when they are turned loose in the farm yard.

Root houses are necessary on every farm where young cattle and cows are kept, in which may be placed carrots, cabbages, turnips, potatoes, &c., for winter feeding.

Poultry houses may be so contrived, that although covered by

one roof, there may be entrances, as well as breeding places for each sort of poultry, that they may be kept distinct from each other, and attached to this a large yard, fenced in in such a manner as to prevent their flying over, or getting through, and if there is a small stream running through it, so much the better.

In the construction of hog sties, little more is required than that they be made sufficiently dry and warm, and that small yards be provided for holding troughs, and the reception of food. The cheapest method is to build them with shed roofs, neither very high or wide; seven feet wide is sufficient for a division, but there ought to be many of these, in order to suit different purposes, and contain different breeds of hogs; some should be made for sows when accompanied by the boar, others for breeding sows, for farrowing, weaning the young pigs, and fattening in. As hogs are apt to slop over and spill a part of their food, by getting their feet in the troughs, there should be a thin piece of board nailed on the back part of the troughs, so as to come forward, in a way to admit their heads only.

Coal and wood houses are very necessary, and may be constructed to suit the taste of the occupant.

Work shops are extremely useful and convenient, for making and repairing different kinds of tools, as well as preserving materials ready seasoned and prepared for the purpose of constructing or mending plows, harrows, and other implements of husbandry. I have one such, provided with a complete set of carpenter's tools, a work bench, turning lathe, grindstone, &c., and have all my wagons, harrows, and other farming implements made on the farm.

Where farms are extensive, and many servants required, a farm building is necessary. This should be detached and distinct from the other houses and offices, as persons of this description are very negligent of their fires, candles, &c. A portion of this house may be set aside for single men, and they can be accommodated in a narrow compass; this is done by fixing the beds in double tiers, one above another. In such a room I would have large windows, so as to admit readily a free circulation of air.

Besides the buildings and accommodations which have been already described, there are several others that are frequently

necessary both for the convenience of the house, and the feeding and management of different kinds of stock; such as baking, washing, slaughtering animals in, and for keeping pigeons, bees and other stock of a similar nature.

The situation and construction of many of these are, however, not only so simple and well understood, but must so frequently depend on particular circumstances, that it is unnecessary to give detailed accounts of them.

Prof. Mapes had received some Imphee seeds from a Mr. Reed. He raised the plants, but found them of little value. Reed had, as he said, got them from Mr. Wray.

Leonard Wray said he had no knowledge of Mr. Reed, or of ever giving him seed of the Imphee. In answer to questions Mr. Wray stated, that several of the ten varieties which he had, were proved by Beaume's saccharometer, to contain as much sugar as the common sugar cane. The product of sugar depended chiefly on soil, situation, &c.

His remarks were well received, and Dr. Underhill moved the thanks of the Club to Mr. Wray, for the introduction of the Imphee into this country. Carried unanimously.

Dr. Underhill asked Mr. Wray which were the best of the Sorghums?

Mr. Wray—What is termed Sorgho's mother! the original. The Imphee seed, in Martinique, yields a good flour, on which the slaves are fed. I have planted Imphee in Canada.

The President called up one of the subjects of the day—"The flail or the machine for threshing?"

Solon Robinson—I have nothing further to say upon this subject, but I hold a letter from the Hon. Geo. Geddes, an Onondaga county farmer, which I will read, as follows:

FAIRMOUNT, ONONDAGA CO., N. Y.,
March 15, 1858.

I see by the papers that you have used my name in the Club, and quoted something I have said about the merits of thrashing machines and flails. I do not know exactly how I have been understood, so I will now give you some of the reasons that make me think that the flail is better than the large thrashing machines

for most of the farmers of Central New-York, except in those cases that require the grain to be thrashed soon after it is harvested. The ordinary price for thrashing wheat with the traveling machines here is five cents per bushel, the owner of the machine having with it two men and four horses that the farmer must feed. The farmer must provide six more horses, and from five to eight men—say an average of seven. All the expenses will bring up the cost of thrashing to ten cents a bushel. I have paid that for thrashing a large crop. Wheat is the only crop that makes so good a comparison for the machine, for ten cents is just a fair price for flailing out wheat in the winter—the thrasher binding up the long straw, and feeding the short straw during the day to the sheep, &c.

Barley can be thrashed with a flail for three cents less than by machine. Oats about the same, and yet there are cases where we use machines. Last fall we could sell our wheat for $1.50, and our barley for $1.00, so we hired a machine and put the crop into market, well knowing that the prices must fall before winter. We appeared to save about half a dollar on each bushel, but there is some draw back on that calculation. Our men being thrown out of this thrashing in the winter, we have had to look up work for them that we really did not want to do, and we have lost our straw nearly, as the heavy rains of October and November could not be kept from going down through the stacks and injuring them very much. Though our sheep have had a vast amount of good hay, they are not in as good order as usual at this time of the year. Most of the farmers in Onondaga raise grain, make some butter and cheese, raise a few cattle, horses and sheep, and intend, during the winter, to make their stock eat and trample under foot the straw of their grain, so as to get it into shape to manure their fields. The plan of thrashing it during the winter, either by flails, or stamping it out with horses on wide floors, or thrashing with a very small machine, that two horses and three or four men can handle, has this advantage, that all the short straw is fed from day to day as it is thrashed, and thus nearly every grain saved in some way. The long straw is either sold in the towns or to the paper makers, or otherwise disposed of. This

plan of doing business makes the manure ready to be cast into heaps as soon as the frost is out of the ground, where it will rot in time to be put on meadows or wheat in the fall. Using machines as we did last fall, we now have immense stacks of poor stained straw in the yards that cannot be rotted in time for next fall's manuring.

When the country was new we had land to clear and lumber to make in the winter. This has gone by; and what can we find for the men we must have in the summer to do in the winter, if we hire these immense ten horse power machines to come, and in a week do what these men can do, cheaper and quite as well, in the course of the winter? In countries where the grain cannot be housed, of course it must be thrashed at once; but where it can be housed, unless there is a strong prospect of a great fall in prices, as was the case last season, the farmer will find it to his profit to keep this winter work for his men that he cannot do without in the summer, and by doing this he can raise a few sheep, calves and a colt or two without losing money on them.

The large ten horse thrashing machine is moving out of this State, and Emery's, or some other little affair, and the flail are taking its place. Economy we must study in every branch of farming, or go behind; and here in Onondaga we find that grain raising does best when combined with some stock-raising. And as our great outlay is for labor, we must study and find out the most economical plan of employing men. We have on our farm five families, living in houses built for them. In the summer we require the services of all the male members large and strong enough to be useful. In the winter these men must be employed, or their summer wages must be very high to support them in idleness in the winter. Thrashing is the only employment the farm can give them, and in this view, thrashing, in fact, costs but little; for the money paid to these men during the winter enables us to employ them in the summer at reasonable prices. The result, to them, is constant employment; to us, economy in the first cost of thrashing, and great collateral advantages. Among them, facility of converting part of the straw into manure, keeping the remainder in a fit condition to be sold, wintering

stock better than it can be wintered on hay alone, giving us our manure in season for top-dressing for meadows, and wheat the next summer. The manure thus applied being worth much more and handled at less cost than when managed in any other way known to us.

One point more and I have done. Many persons think that machines thresh cleaner than flails. I have had a great deal to do with machines; but I never saw one at my barns, or my neighbors', that did not leave grain enough in the straw to make the stacks green with sprouted grain as soon as the rain wet them, if the weather was warm. Five hundred bushels of wheat, and sometimes six hundred, threshed in a day; and this last named quantity has been threshed on my farm, results in carrying to the stack more grain than a good thresher with a flail will leave in the straw. But why thresh five or six hundred bushels in a day? Because well filled clean wheat yields that amount from a machine driven by ten horses for twelve hours. The grain carried to the stack is lost. Whatever the flail leaves the stock eat, as the straw, bright and fresh, is carried out to them during every hour of the day. A good thresher will leave but little, and that little the sheep know how to find. And oats and barley are, when thus fed to stock, worth their usual market price, and wheat more than half the usual market price.

Respectfully yours,
GEO. GEDDES.

P. S. I send you herewith a small sample of clover hay, cured as I attempted to describe to the Club. G. G.

Several gentlemen expressed themselves favorable to the use of small machines for threshing, driven by one horse power, and managed by two or three men.

Dr. Smith said that although it might appear singular for an Englishman to talk to American farmers about threshing, yet he had some experience, and spoke in favor of small one, or two horse power machines, as having proved very successful even where labor is so cheap as it is there.

Solon Robinson—I have no doubt of the advantage of threshing by machinery, but there is one advantage in threshing by

flail that is not sufficiently thought of—that is, the muscular improvement of laborers engaged in that kind of employment during winter. A man thus employed would be much more valuable in summer than one employed in any sedentary work, or one who spent his winter in idleness.

Prof. Mapes, T. W. Field, and Mr. Smith, of Ct., advocated employing men in draining and other farm improvements during winter, instead of threshing. Mr. Smith advocated the preparation of swamp lands for growing cranberries, and spoke of great success, in Connecticut, in growing cranberries both upon wet and dry land.

Prof. Nash—In a southern region it is not difficult to keep hands employed in winter, but it is here.

Wm. Silliman—On my farm of 170 acres, in Westchester county, I find no difficulty in employing men in winter, but I do find difficulty in getting as much work done in winter as I wish to do.

Dr. Underhill—Digging muck for manure is an employment that should keep thousands of men busy in winter. I have used over 30,000 loads, and I can find no substitute equal to swamp muck.

Prof. Nash—The thinking farmer, it is true, can find work for himself and others in winter, but the much larger class, the unthinking farmers, cannot, and it is this want of employment that is the greatest detriment to farm improvement in this country.

Invitation to meet the Geographical Society.—John Jay invited the members to attend the next meeting of the Geographical Society, at the University, on Thursday evening, when agricultural statistics will be under discussion.

Mr. Smith gave some interesting information upon the subject of cranberry culture. A plat of cranberries are now growing in Connecticut, from seed which he sowed some years ago, and he spoke of a man who planted sixteen tons of vines obtained from Cape Cod, and he is so well satisfied that he will plant ten more acres. The plant that proves most successful is to strip off the whole turf from marsh land and set the vines, and, if the land is not sandy, add sand as the only manure. The muck can be

dug for manure from swamps, and the ground then used for cranberry culture.

Prof. Mapes stated that he had sold, this morning, a hundred pears grown by him last season upon dwarf trees, for $12. 50, and thought it decidedly more profitable than growing wheat, whether threshed by flail or machine.

CULTIVATION OF SWEET POTATOES.

Solon Robinson read the following interesting letter from a practical sweet potato grower, A. W. Hilman, of Sharpstown, Salem county, N. J., for the purpose of enabling the Club not only to obtain the valuable information it contains, but to have it published in the transactions for future reference. It is addressed to him as agricultural editor of *The Tribune*, as follows:

Sweet potatoes are raised very extensively along the eastern shore of the Delaware, on the light sandy soil that extends thirty miles southward from Camden. The principal markets are Philadelphia, New-York, Boston, Wilmington, Delaware, and Baltimore. The varieties cultivated, are Nansemonds, Early Yorks, and Bermudas. The first named grows large, long, and rougher than the second, yields abundantly, but does not suit the Philadelphia and Wilmington markets as well as the Early Yorks, which are marketable earlier, and grow more smoothly and compactly, and are the most generally cultivated. The third, a new variety, received from Bermuda, of a light red color, coarse and rough, is inferior to the first two for the table, but attains a marketable size earlier than they do, and produces a much larger yield.

Sweet potato seed is all sprouted in hot beds, which is made about the middle of April, nearly as follows: In a sheltered piece of ground with a south-easterly exposure, dig the ditch for the bed one foot deep by five wide, and about two and a-half feet long for each basket full (five-eighths of a bushel) of seed. Stake boards at the ends and sides to make the whole depth about two feet; put coarse hay in the bottom, so that when well trodden it will be one-third full. If the hay is dry, it must be wet sufficiently to make it heat. Next, put on good horse-stable manure, that has not fermented nor been water-soaked; have the

manure thrown along side of the bed, shake it loosely on the hay (walking backward so as not to pack it) to the depth of six inches or more. Then take a broad board, lay it on the manure, and walk gently on it to give it uniform surface. Upon this put a layer of fine sandy soil, about four inches in depth, on which the potatoes are laid, so as not to touch each other, small ones being generally used. Cover the potatoes with the same kind of earth that was put on the manure, so deep that when your fore finger is thrust through it, upon the potato, the earth will come to the middle joint. Cover the bed with coarse hay, two or three feet deep, to prevent the heat from escaping, and the rain from wetting it. Take off the hay in the heat of the day, from nine to three o'clock, if it is warm weather. When the bed begins to heat it must be examined by running the hand into it. A moderate warmth is all that is necessary; more than that will be injurious, and must be counteracted by leaving off the cover at night, or by applying cold water. When the plants appear, and afterward, they must be watered daily, unless the bed should be too cold to allow it. Warm water from a pond or ditch is best. A basket of seed, if small, is expected to produce at least 1,500 plants; sometimes more than double that amount is obtained. Large seed don't yield so much. Light sandy soil, free from undecomposed vegetable matter, is generally selected for the crop. Plow as for oats, harrow thoroughly, mark it out thirty-three inches each way for the hills.

The manure for sweet potatoes must be well rotted by composting it, or otherwise. Marl mixed with it is an advantage. From eight to thirteen two-horse loads, according to quality and abundance, are used per acre for composting. When rotten, a one-horse cart load will make from 250 to 400 hills. The hills should be made, or the manure covered as soon as it is put in the hills. From four to six good hoes full of earth are sufficient to make a hill. The plants are taken from the bed and put into the hills about the middle of May, and so onward to the first of July. As often as one growth of plants are pulled another takes its place. Care must be taken, when pulling the plants, to hold the potato firmly in the bed by pressing on it with the left hand.

In setting out plants, a boy drops a plant on each hill, taking two rows at once; a man follows, and taking the plant in his left hand, runs three fingers of his right hand through the top of the hill into the manure; as he withdraws them he quickly thrusts in the root of the plant to the bottom of the hole, and then, with the thumb and finger of each hand, firmly presses the earth around the plant. Plants are best set out when the ground is not too wet and cold—much better before a rain than after. The crop is tended with small cultivators and hand hoes. One hand is allowed to attend 40,000 plants, or about eight acres. The crop is generally dug with large hoes made expressly for that use. When stored for spring, they are carefully placed in baskets, in the field, and then emptied into boxes or barrels, and sometimes covered with dry sand, or leaves, or cut straw, but often without anything to keep the air from them but the lid of the box, which, if tight, is mostly sufficient; but the room must be kept dry and warm. If the crop brings $50 per acre it is considered to pay expenses. All over that is profit; and 250 baskets per acre is a large yield.

Upon the same subject I have lately had several letters from O. S. Murray, of Forest Hills, Warren county, Ohio, who does an extensive business in growing sweet potatoes, and sprouts for those who rather buy their seed than grow it for themselves, since the growing of a small quantity is considered too troublesome, but more because people have lacked the very information given them in the letter just read. Mr. Murray says sweet potatoes have been grown to advantage in Vermont, and I know they have on the shores of lake Michigan. Mr. Murray uses only the Nansemond variety. He says:

We have never used glass for these plants, preferring to give them as much air as possible, making them the more hardy. Put the seed in the bed about the middle of April; transplant after they have been above ground two or three weeks, according to the rapidity of the growth, any time before they commence running. Place the potatoes in the bed so that they will scarcely touch each other—a bushel on from twenty-five to thirty square feet, according to size of potatoes. We keep them through the

winter in cellars, prepared at expense for the purpose, warmed regularly from fall till spring. On a small scale, with experience and plenty of manure, the crop should be, in good seasons, from 150 to 200 bushels.

Adrian Bergen—Our boys used to love to use the flail in the winter, and they now think it hard work, but it is good for them; but now we are getting machines.

Jeptha A. Wagener exhibited the drawing of his machine—the "Seed Harvester." It costs $1,000; but on the large farms of the west it will reap and bag grain for one shilling a bushel.

Wm. Silliman, of Westchester—On his farm of an hundred and seventy acres, uses a machine which thrashes, chops hay, grinds apples, can saw wood!

Prof. Mapes—Where there is a small crop of grain, the farmer had better buy his bread than go to the expense of a machine.

Mr. Field—Our immense swamps demand our attention and work. Governor Hammond has cleared up and brought into use some 1,500 acres of swamp, and it now grows cotton, corn, &c.

Asher L. Smith, of Lebanon, Conn.—A townsman of mine pares off the muck swamp for manure and then plants cranberries on the rest. But cranberries grow as well on dry land and never run out, give for a best crop well raked out, a great amount of berries.

Solon Robinson—Let us have cranberry for our next subject. Carried.

Prof. Nash remarked that there was plenty of winter work in our northern States; but it was necessary to lay out that work, and the men can be kept busy all winter!

Dr. Underhill moved as a subject—"The best grapes for the middle and southern States." Add that to "Vineyards."

Mr. Benners, of Astoria, presented grafts of the Duchesse D'Angouleme, Bartlett, Bergamot and Columbia pears, for distribution.

Wax beans given by Mr. Pease, were distributed; some seeds of Japan squash also.

Subjects for next meeting—"Vineyards," "The best grapes for the middle and southern States," "Cranberries."

The Club adjourned. H. MEIGS, *Secretary.*

March 30, 1858.

Present—Messrs. R. L. Pell, Pierce, Solon Robinson, Hon. John D. Ward, of Jersey city, Adrian Bergen, of Greenfield, Long Island, Hon. Hugh Maxwell, Mr. Fuller, of Williamsburgh, Mr. Bruce, Hon. R. S. Livingston, Dr. Edgar Peck, of Brooklyn, Prof. Nash, Wm. Silliman, Esq., of Westchester, Judge Scoville, Dr. Underhill, of Croton Point, and others—nearly 100 members.

Robert L. Pell, of Pelham, President of the Institute, in the chair.

Mr. Meigs, the Secretary, read the following extracts and translations made by him from the most recently received articles, viz:

[From the National Intelligencer, March 24, 1858.]

NATITE AMERICAN GRAPES.

Mr. H. C. Williams, agent of the Patent Office, to explore Arkansas, part of the Indian territory, and Northern Texas, for our grapes, has brought home numerous varieties. He travelled 800 miles on foot, looking for grapes, and has brought cuttings and vines, which will be first rooted and then hereafter distributed. Of the principal varieties, the Washita, a white grape, is deemed the most excellent. It has been introduced into France, and there pronounced unsurpassed by any kind there, both for wine and table. Some famous native plum trees, have also been obtained from our great west.

We have received "The official report of the California State Agricultural Society, fourth year," held at Stockton, from Sept. 29th to Oct. 2d, 1857, inclusive.

This report contains 190 pages, octavo, and is full of interest to agriculturists, by reason of the unexampled vegetable growth of that country, far more important than all its mineral wealth. We quote a few lines:

"In the mountains, Sierra Nevada, (snowy mountains,) from the extreme north to the south, the whole length of the State, eight hundred miles, are thousands of rich fertile vallies, from which, watered as they are by never failing springs, gushing from the mountains and hill sides, producing every variety of Northern and of Tropical grains, grasses and vegetables, of quality and in quantity to suit the most exacting cultivator. The farmer and

gardener from sterile New England, who lives one-third of the year in a snow bank! and the balance in hard toil among stones, &c., here find unsurpassed climate, health and salubrity, as well as fertility.

Messrs. White and Kelsey, near Oakland, have sold this season 4,200 lbs. of strawberries, "British Queen" and "Boston Pine;" over 8,000 lbs. of raspberries. They think that the Isabella grape will soon supersede all other kinds for open culture!

The committee on farms visited the farm in Alameda county, one of the best agricultural districts of California; it contains 800 square miles, and gave great crops this season. It has over a million of fruit trees; over 13,000 cattle; hundreds of thousands of grape vines are growing; and of fruit trees, lemon verbenas, are growing, of twelve feet height; sugar cane flourishes; a rose geranium, quite a tree; thousands of orange, walnut and others growing.

Sansevaine and Brothers, have 53,000 grape vines, handsomely dressed, heavily loaded with fruit; will make 80,000 gallons of wine this year.

Messrs. Fraehling expect to make 80,000 gallons of wine this year.

John McMurtue's orchard, contains 1,600 apple trees, planted quincunx, 16½ feet apart.

Geo. Lee has 1,000 orange trees in nursery; pine apples, bananas, citrons, lemons, coffee trees.

Hon. Wilson Flint has 75,000 peach trees, one year from the bud, forty varieties; 20,000 apricots, six varieties; 5,000 nectarines; plum, forty varieties, 5,000; cherries 18,000; apple 15,000; pomegranates 1,000; grape vines, one and two years old, 50,000.

Mr. Lich's flour mill, turns out 200 barrels a day of superior flour.

Mr. L. E. Gould's orchard, 90 acres, is full of fine fruit trees. He has a flourishing field of Chinese sugar cane, (Sorghum.)

Thomas Fallon has fine pears. Among them are four old Spanish trees of sixty years old, grafted in 1854, with the Bartlett, which produced this year 3,000 lbs. of pears, which sold for $600.

Mr. F. G. Appleton has over 200 bee hives which produce three or four swarms annually. Honey of the finest quality.

The valley of San Jose is superb; has two colleges, several academies, with 290 students.

Capt. Aram has an orange bush, three years old, and over twenty feet high.

Wild clover at San Joaquin, California, yielded four tons per acre, and was five feet six inches high.

Chinese sugar cane, at Stockton, California, attained no greater height than on Long Island, viz: eleven feet, and in weight forty tons per acre.

THE SORGHUM OF CHINA.

Mons. Nouel, in St. Dennis en Val, (Loiret,) sowed some broadcast, and some in hills, and the product was about fifty tons weight of plants per acre. It was chopped small and fed to stock to fatten them. They eat nothing else (the cattle,) from September 2nd to November 10th, or for six weeks of that time; cows fed on it gave more milk, considerably. Sheep fed on the green crop, sowed broadcast. Horses fed on the stalks chopped. Sheep did not relish the green crop much. Cows and horses liked it. The new shoots from the stump, cut off, were not relished.

HORTICULTURAL EXHIBITIONS AT SHANGHAI.

A single flower attracted a crowd of visitors. It was an epidendrum of rare and costly sort, called by the Chinese, Hwni-tan-hwa. The price of it is 400 francs. The flowers are green, almost entirely like its leaves. It is bought only by wealthy persons.

[Bulletin Mensuel De La Societe Imperiale Zoologique D'Acclimatation, Paris, Jan. '58.]

DIOSCOREA BATATAS.

Some of two years growth have attained a weight of five pounds. The question is, shall we consider it a one or a two year crop? What soil suits it best? How to make the root shorter and thicker than we now have it? Hardy, of Algiers, has raised some of this character. Perhaps by selecting short thick roots for cultivation, we may succeed; but we know that thick short roots will yield long and thin ones ; perseverance in planting the short thick ones may ultimately succeed ; plant them in shallow soil with a hard sub-soil! Gasparin has succeeded with some potatoes in that way. We sum up by saying that this Dioscorea

Batatas, or Igname of China, gives magnificent products, is acclimated, and its cultivation is realized in France. We doubt whether the Ignames of New Zealand, of India, or of the Moluccas can succeed here.

TREES FROM THE TROPICS FOR EGYPT.

We have a letter from our member, Doctor Figari Bay, a member and director of the Botanic garden of Cairo, desiring us to send to Cairo seeds of the forest trees of the intertropical regions, that the borders of the desert may be clothed with verdure. Napoleon has already made fountains of fresh water on the desert, where none ever were since the deluge! Dr. Livingstone is about sailing into the heart of Southern Africa, in a steamboat! Will Africa be subdued by the agricultural and mechanic power of the civilized world?

DOMESTIC LIGHT, SAFE AND CHEAP,

Is a matter of much more National importance than is usually supposed.

Mr. Meigs—Our republic now contains about thirty millions of people, living in about four millions of dwellings. Five winter months lights are wanted from 6 o'clock P. M. until 9 o'clock P. M., and in the morning from 5 o'clock A. M. to 6½ o'clock, to make ready for the occupations of the day. Then if only a single light is used for the winter evenings and mornings, there must be daily lighted in the republic, eight millions of lights. The long evenings of winter, especially demand our attention; for it is then, or hardly ever at another period of the twenty-four hours, that the master and mistress, children, servants and guests, assemble around the table to read the bible or the newspaper, or magazine or history, &c. A single brilliant light, near the centre of the table, suffices for all the readers and for those who prefer drawing, &c. The wretched penny dips, would stultify a people! There is no good reading to be done by such darkling candles!

Inventors have within a few years given us brilliant carbonic lights, many of which explode and are worthy of national execration for the cruel murders they have committed on (usually) poor servant girls who alone have the cleaning, fixing and lighting of them! for masters and mistresses never touch them.

Now let our great light givers furnish a safe brilliant! It is a scandal to us not to have done it long ago. Everybody knows the great fame acquired by Argand, of France, about 100 years ago, by his splendid lamps! a tubular wick holder, which admitted air from within as well as without, to feed the flame abundantly, was as bright as our best gas lights! Its consumption of oil was compensated by that brilliance. I suggest the Argand burner as being nearest in perfect combustion. I have seen many little contrivances for warming the oil, &c., in the lamp, by means of a metallic rod heated by the flame and transmitting that heat to the oil below.

At all events, the Republic must have in every house a bright light, from substances which cannot, under any possible circumstances explode. We have not a list of those victims of explosive fluids of the last fifteen years! but it would make one of the most terrible catalogues of horror—"Young girls burned to death;" surpassing the atrocities of Nina-Sahib, of India.

Chester Coleman, of Canandaigua, sends a prospectus by Henry Howe, Esq., of that city, for his Agricultural School, at his residence, two and a half miles distant from the railroad station in Canandaigua, where conveyance to his school is always convenient. He holds two sessions per annum—first Wednesday of April, for seven months; first Wednesday of December, three months. First session, $140 per student; second, $60—one half in advance, &c.

Mr. Fuller, horticulturist of Williamsburgh, presented cones and leaves of the Washington Gigantea, of California, and a young tree of a few days growth from the seed. The seed of this vegetable monster is smaller than parsnip seed, and very like it in form.

Mr. Meigs distributed some of the seeds he had received from Mr. Norcross, of San Francisco, through the kind agency of J. Connor Smith, Esq., of the Metropolitan Bank, of New-York.

HORSE SHOEING.

The Chairman on this subject remarked, that when you observe your horse straightening his pastern bone, and thus throwing the weight of his leg on his coffin bone, and sparing the

navicular bone, you may make up your mind that he will soon be very lame, and ninety-nine times out of a hundred, you may attribute it to bad shoeing.

The foot of a horse is composed of sundry lamina, combined in such a manner as to form a perfect and most elaborate spring; the elasticity of which can only be secured by giving it free scope to expand and contract every time he moves. And this can be accomplished by using five, instead of nine nails. And I frequently use but three; being particular that the nails cross the lamina, in the hoof, low, instead of high; and that there is a good clip at the toe. The membrane lining the horse's hoof, is exceedingly sensitive. This is an anatomical fact, and must be borne in mind by the smith, lest he wound it. Blacksmiths always ask you for what kind of work you wish your horses shod; and if you say to work before the plow, in a stiff clay, he will put thirteen nails in each shoe, which is a barbarous and unnecessary humbug, as three, or five nails, placed in a perfectly well fitted shoe, will hold it on better than more, at any kind of work that you may feel disposed to put the horse to. I will engage to have any horse shod, with three nails in his fore shoes, and five in his hind shoes, and permit him to be used in soft tenacious clay soil for a month, without detriment to them. And I boldly assert, that no horse, either large or small, should ever have more than five nails in a shoe; and at the same time that three will, at all times, and under all circumstances, be sufficient, if the shoe is perfectly made and fitted. It is as necessary that the shoe should be made to fit the horse's foot, whatever shape it may be, as it is that the shoe should fit the human foot. I never have yet met with a smith who did not pare, trim, cut and burn the hoof to fit the shoe, instead of arranging the shoe to fit the hoof. If you use five nails, place three on the outside, and two inside. The first one may be placed one and one-half inches from the centre of the hoof in front; the second in the centre of the quarter; and the third behind. On the inside, place the first nail one and one-quarter inches from the centre of the toe; and the second an inch behind it. You thus avoid pressure on the sensitive parts of the hoof. When a

horse runs he clears, at each bound, about twenty-three feet, and touches the ground with but one foot at a time. Consequently, the whole weight of the animal falls upon a single shoe every leap he takes. It is, therefore, indispensable that it should fit the crust of the hoof from heel to heel, and have an equal bearing all around; and that the surface of the hoof, which protects the edges of the lamina, should never be rasped with a file. This the smith always does, as he considers it the most ornamental part of his business; and usually finishes off by destroying this wonderful design of nature; and not this alone, but likewise pares the frog with his knife, which should on no account be touched.

There is a difference between the hind and fore feet of a horse; still the same rule holds good with regard to the shoes, and, as in the management for the fore feet, they must be made to fit the foot in such a manner as to bring the heels near the frog, and at the some time to allow for the expansion of the inside quarter. Blacksmiths usually square the toes of the hind feet and place clips on each side of the shoe to prevent them from striking against the heels of the fore shoes, making the disagreeable noise you often hear when the animal is traveling fast. But as a horse never does thus strike, the object is defeated. The outer rim of the hind shoe strikes the inner rim of the fore shoe, in the rear of the quarters. Consequently, squaring the hind toes adds to the difficulty instead of remedying it. It is better practice to make the toes round, or rather leave it as you find it, and turn a clip up in the centre. The blacksmith should so arrange the holes in the shoe that the nails may be driven straight through the strongest portion of the lamina, across the grain, and low down in the shank, and the head must be hidden in the groove. It is customary so to incline the holes, that it is next to impossible to direct the nails in sach a way as not to cause the horse disquietude, if he escapes pricking. Broken knees, and irretrievable lameness, is often caused by misplaced nails, but more frequently by the abominable and unpardonable carelessness of the smith, when removing old shoes, which he wrenches off with the most wanton violence, invariably forcing the clenches through

the crust by immoderate force, thus unnecessarily destroying the hoof of the horse. I have seen smiths remove two shoes at a time, which should never be permitted, as it causes the horse to be restless, and induces him to stamp, and thus break the crust of the foot, besides causing him much pain. I can always discover whether a horse has been well shod, by examining the frog, which consists of three parts; the thick elastic frog, the horny frog, and the sensitive frog. The elastic frog protects the navicular joint from injury. If the shoe has been put on by a skilful mechanic, the whole frog presents a plump full appearance, without the sign of a knife. When left to nature, it at times has a ragged surface, which wears off through the process of reproduction, and leaves a perfect frog behind. Horses have an external and internal part to their feet, the former comprises all the outside, horny and insensible portions, covering and enclosing, as in a case, the internal sensible foot; and is distinguished into the crust, sole, bars and frog. The internal sensible foot is composed of small parts; it is contained within, and defended by the former. A strong arched sole will require much shortening at the toe, and paring until it will yield to hard pressure by the thumb. Whereas, a weak flat sole, will bear but little shortening, and scarcely any paring. All you can do for such a foot, and they preponderate, is to use the knife as little as possible, and put the shoe on evenly, as exfoliation and reproduction progresses slowly. Nature causes horses to have flat heels, which answer the purpose admirably, as long as they are left to her influence. The animal can then select his ground and place his foot where it will be safe from injury. But the moment he is controlled by man, with bit, and whip in hand, no regard is paid to these matters, and he is driven without reference to his frogs, or his heels. And if not properly shod, lameness is inevitable. When shoeing the animal, his changed condition should be taken into consideration, and his shoes so constructed as to guard his feet against the numerous strains and injuries incident to the change. This may be effected by keeping the foot remote from the ground, and the most practical way of doing it is to use the shoes I invented some five or six years since.

They have a wide web to protect the frog and sole from injury. The heels are rounded by lengthening the outer rim, and shortening the inner, which does not in the least diminish the width of the web. The groove in which the nails are placed, is wide, to afford ample space for the head of the nail, so that it may not project above the shoe. A wide clip is turned up at the toe, to prevent the shoe from being driven back, and thus bending the nails. The five holes for the nails, must pass straight through the iron, and not at an angle, as is usual. These holes must be countersunk, and the nails made oblong on the top, and straight at the sides, with a well shouldered head; and when driven home, must fill the orifice. The points are twisted off after passing through the crust of the hoof; a small notch cut to receive the remaining projecting portion, which is clenched down and buried in it by the smith's hammer. Five quarter inch holes are made in each shoe; one at the toe, one on either side, and two at the heels, in which are fitted case hardened steel points, with a shoulder, that may be removed at pleasure, with a nippers, and sharpened without disturbing the shoe. Such a shoe would entirely prevent horses from slipping on the Russ, or any other pavement; and do away with all the plans extant for its destruction.

Horse shoes may be manufactured of two thicknesses of metal, properly galvanized, and nicely riveted together, and then re-galvanized, that will be perfectly noiseless. The foot of the horse may then be prepared to receive the shoe by simple adhesion, after which it can be taken off and put on the pleasure of the groom.

Dr. Smith alluded to the necessity of greater veterinary knowledge in this country, and paid just tribute to Capt. Ralston for the efforts he has made in this behalf. It really makes me glad, said he, to see anything done toward treating the poor horse with more humanity.

The subject of "The Grindstone," was then taken up.

Solon Robinson said, this subject, which was before the Club two weeks ago, and which, from what was then said, has since elicited a good deal of interest, was again called up, and several persons spoke upon it.

Judge Meigs thought a good grindstone on a farm equal to one hand, where several are employed, as they would save the labor of one man by using sharp tools, such as a good farmer with a good grindstone will have. This discussion of a subject that may appear trivial is calculated to do much good.

Solon Robinson—I rise to read a letter from J. S. Whitney & Co., who have been thirty years in the trade. One paragraph of this letter reads as follows:

"As manufacturers, and importers of and dealers in grindstones, we desire to express our thanks for your eloquent tribute to the convenience and utility of the article, in your remarks before the Farmers' Club."

They state that they have grindstones from England, Scotland, Sweden, France, Nova Scotia, and Ohio. Is it possible that this country only furnishes one-fifth of the supply of this important necessary of life, that is of farm life. For I contend that no man can live without a grindstone, however long he may stay. We probably have as good grit in the United States as can be found in the world. In Arkansas there is stone that compares well with Turkey oilstone. In White River, Indiana, there is an extensive bed of stone that makes the best grindstones I ever saw for carpenter's tools, and the best whetstones for universal use, being both sharp and fine.

In the Lake Huron region there are excellent beds of rock for grindstones of very superior quality. Yet it appears that, with the exception of the few that come from Northern Ohio, our supply comes mainly from abroad. This is one of the grindstone abuses. It is an abuse of the good gifts provided abundantly for our use.

Mr. Robinson also read an amusing and interesting letter from a correspondent who signs himself "Grit." No doubt he is a gritty fellow. It is quite evident that he has had his nose to the grindstone when he turned that hard-headed old rickety affair "for the hired man to grind his scythe." He says, most truly: "There are reminiscences, pleasant or painful, about the grindstone in the life of almost every one brought up in the country, and most of them will feel a twinge in the back as they read your late humorous description of grindstones, such as are found about

too many homesteads." The following extract from the letter contains a useful hint We advise its general adoption wherever there is a poor devil that don't own a grindstone:

"Not long since, a respectable, well-to-do Jersey farmer called on the dealer to get two grindstones. One he wanted 'a good one,' for his own use, to be kept in his private sanctum; the other as 'hard as thunder,' for the use of his neighbors, to be put in some exposed place on his farm where they could 'come and go,' and make free with it. He selected the two—the good one for himself, and the poor one for his neighbors. Now this was a sensible man, and no doubt a good farmer—a sort of farmer who would not keep a grindstone that he loved, for others' use. He will always have a good one for himself, and one as 'hard as thunder' for his 'go-day come-day nobody' neighbors, for he selected a good one for the purpose—one that will long out-last his good one, out-live himself, and descend an heir-loom to his children's children. His neighbors may come and grind, and and grind, and the longer they grind the harder it will get, and there will be no signs of wasting or decay, except a very hard and glazed face, perhaps a reflection of the faces of those who use it —for the farmer that borrows a grindstone must have a hard cheek. It may not be known to every farmer that long exposure to the sun will so harden a grindstone that it will become worthless."

Mr. Robinson continued—And so it seems that a good grindstone, as well as a good many other good farming tools, may be spoiled by exposure to the elements. This is another of its abuses. Many a good grindstone have I seen ruined by standing out doors with the upper part exposed to the sun, and the under part soaking in the trough. In a few months' use, the wet is worn away faster than the dry part, until it hangs out of balance, and then one part is always down and wet, and the other up and baking in the sun, till at length you might almost as well try to grind an ax upon a bob sled, as upon such a poor, one sided and much abused grindstone. I must say that I have always admired the thrift of a Jerseyman. I admire it still more to-day. I commend that man's

example to all the world "and the rest of mankind." By all means buy two grindstones. In fact, no good farmer can do without them. He must have a Jersey pair, and as no good farmer ever did live without a set of carpenter's tools, he should have a nice little fine-grit stone in his shop, for such tools especially, and if the farm stone is not situated convenient to the kitchen, he should provide the women-folks with just such a snug little affair as "the grindstone man" sent me, and which, now that I know its convenience, I would not do without, It is wonderful how any family can live without a grindstone. It can only be accounted for by their ignorance of its use. Hence the abuse of nature's good gifts—living without one.

Don't imagine that I am a new convert to the revival movement in favor of grindstones. No, sir; my convictions date far back In proof of this is the fact that when I moved the first white family into that wilderness of woods and prairie that makes up the north-west county of Indiana, about twenty-four years ago, where I built a house to live in, without a single sawed board about it, not even in the table I ate at, I was able to live very comfortably and happy fifteen miles from neighbors. Do you ask how? I will tell you: I had a grindstone. Yes, Sir; and my neighbors used to come and use it. Think of that. To get up of a cold morning and find a dull ax and no wood at the door, and no grindstone within a dozen miles! Such a man was almost as badly off as another of my neighbors who got up one morning, and although he found a sharp ax and plenty of wood, found that the fire had gone out while he slept, leaving not a spark behind nor a match or flint and steel and tinder in the house; and so he had to walk six miles out to a neighbor's and six miles back, before he could roast his venison for breakfast.

After all, going a dozen miles for fire, or to grind an ax, in a new country like that, is not half as bad as going a dozen rods in an old settlement to borrow the use of a grindstone.

To borrow! a man may be tempted to borrow; and so may a man be tempted to steal. But why should you lend? Is any man too poor to own a grindstone? One don't cost much; and here I hold in my hand an advertisement of a Connecticut

manufacturing company—of what, think you? Why, of cast-iron frames and troughs, mounted with shafts, cranks, treadles and friction rollers, all for six dollars, for the perfect hanging of a grindstone.

Now, let us never hear of a farmer again disgracing his profession by borrowing a grindstone; and save us, we pray, from the sound of a squeaking, groaning, old wooden shaft and crank, and frame to match, such as now stands as a monument of folly and shame, hardening in the broiling sun, upon many a farm, marking the shiftless, thriftless character of its owner.

A grindstone in operation would have been here for examination, only that it arrived a little too late. There is no mistake, the world is improving, and I hope the happy time will come when every man has a grindstone, mounted on just such a frame as the Stone Manufacturing company, of Plantsville, Conn., would furnish him.

Dr. Underhill, of Croton Point, presented three samples of wine, made by him there, from his Isabella and Catawba grapes. One of pure Isabella, without sugar or spirit; one of the two grapes, mixed with some sugar; and one of Catawba. The wine of the two grapes combined, pleased the members most. Dr. U. has 1,500 gallons of his wine in cellar. He has forty-two acres of vineyard at Croton Point, on which he has put several thousand cart loads of the muck from adjacent low lands; that muck, composed as it is, of the leaves and leavings, vegetable and animal, swept down from the higher lands to the swamps below. His Croton Point seems to have been formed of the debris of the rocks and mountains, northwest of it, heaped up on this beautiful tongue of land projected from the eastern shore of the Hudson into the river. He has protected this land from northern gales by forest trees all along its northern side, which almost produce a calm on his land, even in a gale of wind. He originally employed iron wire of large size, extended from stout stakes at about fourteen feet asunder. But now he has these stakes double that distance apart, and finds that the bunches of grapes do better by reason of more room for vibration of the wires—for occasionally he found formerly, grapes crushed on the shorter spaces by violent winds.

Mr. Benners, of Astoria, presents grafts of fine pears, Duchesse D'Angouleme, Bergamot, &c.

Wm. Lawton presents grafts of the Church pear, of New Rochelle.

Dr. Underhill presents Baldwin apple grafts, and grape cuttings.

The Long Island Fish Guano, &c., Co. send samples of their artificial guano, from their manufactory at Southold. It is nearly destitute of smell, is granulated, and convenient for use.

Solon Robinson proposed that the Club meetings shall be hereafter on Mondays, instead of the Tuesdays, as heretofore, in order to accommodate the press of New-York.

Dr. Smith, of the New-York Times, seconded the motion.

Secretary Meigs said that the Club was under the direction of the Committee of Agriculture, of the American Institute, and the consent of that board was indispensable. Messrs. Hon. R. S. Livingston and Wm. Lawton, of that committee, hoped that the Mondays may be substituted for Tuesdays—which change they hoped and believed would be adopted.

The Club voted unanimously for the Monday meetings.

The Chairman said that the subject of this day would be continued. That as a matter of course, the Club would always choose the one it preferred for the time, viz: "Cranberries," "Artificial Home Lights," "Public markets, best forms and places," "Grapes for our middle and southern States."

The Club adjourned. H. MEIGS, *Secretary.*

April 5, 1858.

Present—Messrs. R. L. Pell, John Campbell, Judge Scoville, Solon Robinson, Mr. Wheeler, of Wayne Co., Mr. Pardee, Mr. Paine, of Brooklyn, Wm. Lawton, of New Rochelle, Fuller and Provoost, of Williamsburgh, Mr. Bruce, and many others—forty in all.

President Pell in the chair. Henry Meigs, Secretary.

The Secretary read the following translations and extracts made by him from articles received since the last meeting of the Club, viz:

Bulletin Mensuel De La Societe Imperiale, Zoologique D'Acclimatation. Feb'y, 1858.

CHINESE YAM—DIOSCOREA BATATAS.

Botanists do not designate any but Dioscorea under the name of Igname. It appears that in India, Africa and America the starch roots, differ much from one another. Among the various Ignames lately received by the Society of Acclimation, there are the Aroidæs, (caladium, arum,) the convolvulaceas, (Batatas, convolvulus,) and even the composees, (Helianthus.) We have also a native Igname, the Notre-Dame-Seal or Tame, (Tamus Communis of Linnæus,) frequently met with on the borders of our forests, which are of the same family as the Dioscorea or true Ignames. Montigny says that in China the Dioscorea Batata is called Sain-in; other travellers call it Saya. In the Chinese books it bears the names Chouyar, Tschou-ye, Toutchyu, Chanyo, Chan-yu. Mr. Jomard proposes to call it the Montigny Dioscorea.

The word Igname comes from the East Indian word, Inhame or Yam, which is of African origin—Yam signifying to eat—along the coast of Guinea. It is true that two early travellers in America, cited by Humboldt, heard this word Igname on the American continent, viz: Vespucci in 1497, on the coast of Para, and Cabral in Brazil in 1500. However this may be, Burmann, in his Thesaurus Zeylanicus, page 206, in 1737, calls the Dioscorea alata of Linnæus, by the name of Rizophora—Indica or Inhame rubra (red Igname.) We find also in many ancient Botanists, that it was called Igname Malabarica—Inhame Javanica, Inhame Curassavica, Igname Maderaspatana. The word is feminine. In 1846 Vice Admiral Cecille, one of our honorary members, gave an account of it as a long tuber, and sent it to our Musuem of Natural History. It was planted in a pot, under glass, but showed nothing remarkable until 1850. In this year our indefatigable associate, Mr. Montigny, consul of France, at Chang-Hai, sent a number of these tubers to the Ministers of Commerce and Agriculture, as being very much esteemed in China and in Siam. Their culture has perfectly succeeded. They belong to the genus Igname or Dioscorea. Convinced of the advantages of this new Igname, Montigny sent us in 1855 a considerable number of the roots, and little bulbs, (Bulbilles.)

These roots penetrate the earth sometimes to the depth of a metre, each plant yielding five or six, but usually only two or three. They do not contain as much farina starch as potatoes—being sixteen per cent, while potato has twenty. It is very nourishing to animals as well as men. It stands cold far better. It has two sexes on distinct plants. Until 1856 we only had the male plants. Hardy has shown us the female and how to use it.

A few years ago it was in France as rare as a diamond. In 1854 it was worth its weight in gold! In 1855, silver! In 1856, copper! In 1857, iron! Now it sells for about one dollar a hundred pounds weight! Our common potato is worth about forty millions of dollars a year. The potato was called by Voltaire a "trick of nature,"—colifichet de la nature. In 1630, by a decree of the parliament, of Franche Comte, the potato was prohibited as a pernicious substance, causing leprosy.

When we consider the character of the original potato, we may well feel confidence in some new plant. Clusius, in his history of plants, in 1591, gives drawings of two potatoes, not larger than a small plum; since enlarged to the Rohan.

The Imperial Society has sent the Dioscorea to all parts of France, to Switzerland, Germany, Italy, England and Spain. China has given it to France; France has given it to Europe!

We have imported into France many other kinds of the Ignames, viz: The violet one of Linnæus; the Molucca, or Nummularia, of Linnæus; the Cliffort, of Lamarck; the Deltoide, of Wallich; the Giant Igname, of Lamarck; the Bulbifera, of Linnæus; the Aculeata, of the same; the Pentaphylla, (five leaved,) of Amboyna; the Helmia Bulbifera, of Kunth; the Dioscorea Piddingtoni, from New Zealand, which gives round tubers—it has succeeded in Africa.

GUTTA PERCHA PLANT.

France has imported into her African colonies, 300 of these precious vegetables, and hopes to succeed in their cultivation.

The gardens of Messrs. Vilmorin and Andrieux, were already established in 1768, and continue to this day.

[Bulletin Mensuel De La Societe Imperiale Zoologique D'Acclimatation, Paris, 1858.]

NEW SILK WORMS.

Medals awarded in Prussia, for the castor oil silk.

A medal given to M. Albin Gros, for silk stuff made from the oak silk worm.

[London Farmers' Magazine, March, 1858.]

PLOWING BY STEAM—THE LATEST PATENTS.

The latest is by Richard Coleman, May 28, 1855; a series of plows in one machine.

Hand labor with the fork.—Mr. Mechi thought that steam cultivation would soon become the custom of the country; that two years ago he had found, that after all, depth of cultivation, after good draining, was the true manure. Let the subsoil be brought into contact with the air and they would find a treasure which had never before been developed. He had every year increased the depth of the cultivation on his land, and had always been rewarded for it. That recently he had a field all dug over with the steel digging fork, and had found it more economical, in its results, than plowing with horses. There were five horses plowing in one field, and in another field four men fork digging; and he found the latter cheaper at £2 per acre, ($10,) the men earning 2s. 6d. per day (60 cents), than the five horses and two men, in ordinary plowing. The more he saw of horse plowing the more he was convinced that it was the worst and most costly power that could be employed; but at present is unavoidable.

Mr. Fowler, the inventor of a steam plow, said he ventured to say that with his steam plow, he thought he was in the right direction, but admitted the superiority of hand spade cultivation, over even steam plowing. But it was too expensive. That on heavy clay land, steam cultivation equal to spade labor, could be done for twelve shillings, ($3,) per acre. The Royal Agricultural Society had given no help.

Mr. Pell—Lime is the oxide of calcium, a well known metal, and is obtained by exposing shells, chalk, or lime-stone, to red heat, which expells the carbonic acid gas and water; and lime, more or less pure, results—is called quick lime, and is used on land

with the view of converting substances in the soil, to the promotion of growth in plants, and counteracting the evil effects of noxious matters. Lime is particularly valuable when applied to land recently plowed; where portions of the subsoil is brought up, rendering its inert substance useful, and correcting its defects.

Quick-lime should not be long exposed to atmospheric influences, from the fact that it absorbs water and becomes a hydrate of lime; then carbonic acid gas, and returns to its original state of carbonate of lime. It kills not only slugs, worms, but numerous insects; and even destroys their larvæ. Lime has a great advantage over all other substances, to wit: Its power of extreme subdivision, and affinity for carbonic acid gas, which it absorbs greedily, and although it passes rapidly from the state of quick-lime into carbonate, still it acts upon the organic matters it encounters, and decomposes them. Lime, after having been placed upon a sandy loam, quickly divides into fine powder, sinks into the soil and forms a layer of hard calcareous matter; which, in course of time, becomes almost impervious to moisture. These lime floors may be brought up by deep plowing, or by sowing lucerne or clover; the roots of which penetrate the lime, and return it to the surface through their stems. Lampadius tried an experiment to discover whether lime disappears from the soil, or not. He mixed 1.19 per cent with the soil, and analyzed it four years successively.

The first year it contained 1.19 per cent of carbonate of lime; the second year, 0.89; the third year 0.52; the fourth year 0.24. Portions are removed by the plants, by descending below the reach of the plow, and the roots of plants, and by rains. 750 pounds of water will dissolve one pound of caustic lime. Lime causes loose soils to become stiff, and mellows stiff clays, so that its action is good on either.

It supplies inorganic food to plants, neutralizes poisonous and other substances in the soil, transforms inert matter into fine soil, facilitates all kinds of decomposition. I have used lime in various ways advantageously; for instance, I have sowed two hundred bushels to the acre on pasture land in the fall, and plowed it in the spring after, and have found that it had passed

down a considerable distance in the soil, causing it to become very pulverulent. I have spread it upon lands after the crops of potatoes, turnips and grain had grown eight inches high, and have worked it in with cultivators, also upon fallow lands, and have mixed it with vegetable and muck compost heaps very advantageously, but never with animal manures, as it is apt to render several of their component parts insoluble. I have found the lime and salt mixture admirable as a top dressing, mixed in the following proportions: Two loads of lime, say sixty bushels, with thirty bushels of salt in a dry state, placed under cover for ninety days, and use about sixty bushels to the acre; the results were remarkable. But a better composition is to add sixty bushels of muck, during the decay of which new combinations are formed, such as nitrate of lime, chloride of calcium, gypsum, &c. Its utility has been known in England for many years. So early as 1688, Christopher Packe used it for enriching poor and barren land, and considered it the cheapest of all mixtures. Mr. Mitchell, of Ayr, used it many years since, and not knowing what Mr. Packe had done, announced himself the discoverer. His mode was to boil down 3,000 gallons of sea water to 600 gallons, with which he slacked sixty-four bushels of shell lime, and this he considered sufficient for two acres of land.

I would call your attention to another mixture from which I have reaped great advantage, and that is salt and soot combined in equal proportions; it will double almost any root crop. Twelve bushels is sufficient for one acre of ground.

Salt without lime is very advantageous to soil; nearly all plants contain it, and furthermore it preserves plants from injury by frost, as salted lands are only frozen by excessive cold. Cabbages and other similar plants in salted grounds will appear green and flourishing, when the same plants on contiguous unsalted land will be frozen to a state nearly allied to death. It retains moisture in the soil, and likewise absorbs it from the atmosphere. Salt is formed of chlorine and sodium, and is therefore a chloride of sodium. It is without smell or bitterness, melts in a red heat, and is volatilized in a white heat; cold water dissolves only a certain quantity, warm water more, but when it becomes cold,

the overplus falls to the bottom, and the quantity remains the same. This substance has been used from time immemorial for promoting the growth of vegetation in European countries. Red clover, lucerne, peas, asparagus, &c., are greatly benefited by its use. I have used salt upon cereal grains, and almost all the vegetable productions of my farm, at the rate of nine bushels per acre, and it has answered my expectations, and the crops have been materially improved, so much so in some instances that I have thought it superior to any other manure. Thirty-five bushels of salt to the acre will destroy all weeds, kill coarse grass, and in fact all vegetation for a time, but when the reaction takes place, the ground will be found perfectly sweet, and capable of producing superior crops of any description, provided the other chemical ingredients are present; and cattle will seek the portion of land so treated in preference to all others for several years after. On garden lands it will prevent root crops from clubbing. Salt placed in water containing flowers, induces them to look bright and flourishing long after those placed in water without salt have faded. Cuttings, if intended to be sent to a distance, should always be dipped in salt water before they are packed. Salt will be found an admirable ingredient in all garden composts intended for carnations, celery, onions, asparagus cauliflowers, cabbages, &c.

I close my remarks by asserting that lime and salt are indispensable to the fertility of all soils; by analysis they will be found in almost all the leading plants, and wherever a crop is growing luxuriantly, you may rest assured if the soil is analyzed, lime and salt will be there in proper proportion; by the eternal evaporation of the ocean salts are distributed over the whole earth, and carried by rain to the roots of plants.

Mr. Fuller, Brooklyn, stated that he had proved the advantage and economy of hand labor over horse machines, in preparing ground for trees.

Mr. Pardee—It would be impossible for our market gardeners to pay the rent they do, if it was not for the advantage to the soil of hand-labor. It is absolutely necessary to pulverize the soil for many vegetables finer than can be done by horse power.

Wm. Lawton—I have no doubt that the turning point in the success of many farmers in this vicinity is the cost of keeping a horse—an unnecessary horse. I think the cost of keeping a horse anywhere in Westchester county is $150 a year.

In regard to hand labor and the remarks made here by Mr. Robinson about thrashing by flail, and for which he has been attacked in a newspaper, I would say that he did not advocate the disuse of thrashing machines; he only recommended the adaptation of labor to the end in view—remarks that were highly appreciated.

Mr. Pardee—I am reminded of a circumstance in relation to the use of the spade or fork. I have found that by using a fork with long prongs instead of a spade, a man would do more work in one day than in three days with the spade. It is a *sine qua non* in gardening. There is nothing like a spading fork to pulverize stiff clay land, and the secret of success is in the fine pulverization of the soil.

Mr. Fuller—In pulverizing an orchard the plow tears the roots and injures them. In a nursery we must plant four feet apart to plow between the rows, and for spading we need only to set the rows two feet apart, and thus we get 10,000 more trees to an acre. I have no doubt of the economy of hand labor for all crops where land is valuable.

The President—In relation to the expense of keeping a horse, I will remark that I kept my colts till five years old without work, and I can break such a colt in three hours so that he can be mounted, and in three days so that he can be safely harnessed. The secret of breaking a colt is to conquer him, which can be done by fastening up one fore leg, and when he is tired of walking on three legs, throw him by striking out the other fore leg, and when down he gives up, fully conquered. We spoil our colts by early breaking. It is cheaper to keep colts till they are matured before breaking them. The cavalry horses of Prussia are not put to service till eight years old.

NEW WAY TO FEED YOUNG LAMBS.

Solon Robinson—I hold in my hand a letter that details a new way—that is, new to me—to feed young lambs, which, I think,

will be valuable information to all persons engaged in the business, since I have always found the grand difficulty lay in the first drink. Like bipeds, after they got a taste they are ready enough to go in for future drinks. The letter is from W. R. Bunnell, Bridgeport, Conn., who says truly:

"Thousands of lambs are yearly lost in this country from not knowing how to feed them. Many years since, when engaged in the business of wool-growing, a Scotchman raised for me the finest flock of (about 250) Merino lambs I have ever seen, losing hardly one that was born alive. His success was mostly owing to feeding the weak ones with cow's milk, in this manner: With the three lower fingers of the right hand clasp the right fore leg near the foot, and do the same with the left hand and left foot, then raise it up and holding the head of the lamb a few inches below your mouth, insert a thumb and fore-finger into each side of its mouth, opening and holding it so as to let a small stream of cow's milk flow from your own mouth into the lamb's. It may strangle and struggle some, but there need be no fears of injuring it. One or two mouthfuls are usually sufficient, and these may be given in as many minutes. Be sure to give enough to make his ribs bulge some when you stand him on his feet. After a few feedings the lambs will huddle about your feet, sticking up their noses in a most amusing manner, begging to be taken up and fed."

Such feeding and saving of lives will do much to multiply sheep, and thus cheapen food and clothing—two of the essential wants of life.

THE CRANBERRY CULTURE.

This subject was now taken up, and an interesting discussion followed.

Solon Robinson read the following extracts from a letter to the Tribune, from Noble Hill, of Caton, Steuben Co., N. Y.:

"That the cranberry is a favorite luxury, is abundantly proved by the high price which a good, and not unfrequently an inferior article will command in the markets. That it is easy of cultivation, and that there is an abundance of land now lying waste, which is just adapted to its growth, is, perhaps, not so generally known. If the thousands of acres of swamps, of a peat soil, within

the bounds of the single State of New-York, were to be converted, as they certainly might be, into cranberry meadows, I will venture the assertion that The Tribune would never again quote cranberries at $14 or $15 per barrel. And if anything which I may be able to say should in any manner be instrumental in reclaiming those waste acres, or any portion of them, I will agree to share with the Editor of The Tribune those hearty thanks which I am fully persuaded would be forthcoming from many a good housewife. The following is submitted as the result of several years of observation and experience in the cultivation of the cranberry. The subject of my experiment is a swamp of several acres, and of a peat soil. Formerly it was covered with small brush, moss, &c., no large timber being found on it, owing to the fact that it was submerged during a great portion of the year. On the borders of this swamp a few cranberry vines, indigenous to the soil, were to be found. By a series of open ditches leading across it and through a bank at its margin, I was enabled to remove the superabundant surface water. This done, cranberry vines began to make their appearance in different portions of the swamp, but more plentifully in the central portion, from which they began to spread over the land at a rapid rate. In their progress, however, they encountered an enemy in the shape of the above mentioned brush, which not only retarded their growth, and prevented the full development of their prolific qualities, but in some places, entirely excluded them. Hence it occurred to me that an advantage would be gained by thoroughly subduing the soil previous to its occupancy by the cranberry. To this work I then addressed myself, accomplishing it with the plow on the borders, where the land had become sufficiently dry to render that mode practicable, and with a spade in other portions on which a team could not be driven. As done by a spade, the work consists in paring off the surface and throwing the result into heaps, which, when rotted, answer a good purpose as manure for fruit trees. The clean surface thus exposed, should be spaded to the depth of two or three inches, when the process of transplanting may be performed. If, however, the transplanting be deferred until the following spring, and and the soil be occasion-

ally stirred during summer with a hand-harrow, the plants will thrive the more rapidly. They should be set closely, as they will the sooner cover the ground to the exclusion of weeds, from which, if kept free for two or three years, they will thenceforth need but little if any attention. In soil thus prepared, I have transplanted the last of May, and have picked fine clusters of berries the ensuing fall. In two or three years a fair crop may be expected, and thenceforth, so far as my experience goes, will be annually realized. To insure large crops, the soil, during summer, should be kept well saturated with water, and if flowed in the spring all the better. This I accomplish, as far as possible, by a proper adjustment of my drains, opening and closing them according to the variations of the weather, from wet to dry. As to transplanting, there is no difficulty whatever. If an equal number of cabbage and of cranberry plants be set, more failures would be found among the former than among the latter. A cranberry plant a yard long, set in a mellow peat soil, in a wet season, will take root at every point of full contact with the soil. To give you a practical illustration of what old Steuben can do in the line of raising cranberries, without any of the advantages of sea-shore sand, which some think indispensable to their growth, a specimen will accompany this communication. By comparing them with those on sale in your city, you may be able, to some extent, to judge whether they possess any merits that would entitle them to that distinction."

It was generally conceded that finer specimens of this choice fruit had never been seen.

Mr. Robinson said—It is a pity that we cannot convince all the owners of such swamps as Mr. Hill describes that they can grow just as good berries as these. There are many such places within a few miles of this city that are now pests to the owners, that would be profitable ever after, if once set in cranberry vines.

Mr. Pardee—The cranberry has been very much improved—as much so as any other fruit. I don't know of any fruit that offers greater inducements to experiment with than the cranberry, in seedlings, since it has already shown such good results. If cranberry seed, or in fact any other hard seed, is difficult to vegetate, it may be scalded with boiling water.

Solon Robinson—In preparing locust seed for planting, it should be scalded with boiling ley. In regard to growing cranberries, there is no doubt they can be grown upon any soil that has water a few inches below the surface. Upon tolerably dry upland cranberries have been grown to advantage, and they will grow in very bare sand if either naturally or artificially watered.

Mr. Fuller thought they could be grown almost anywhere by properly mulching the surface. He saw them growing last season on Brooklyn Heights by the moisture retained by the mulch on the common garden soil.

Mr. Pardee thought the cranberry plant did not require as much water as the strawberry.

GRAPE CULTURE.

Wm. Lawton—The opinion has prevailed that grapes of foreign growth could be grown wherever the peach flourishes, but that theory has proved a fallacy. Of the large importations of Prince, over thirty years ago, we have but very few varieties. The Isabella and Catawba grapes, both natives, are the only ones that have been extensively and successfully grown in this latitude. The Alexander or Schuylkill grape is a hardy variety, and is a pretty fair table fruit. In regard to cultivating a vine upon a small plot of ground, I will relate the success of a poor shoemaker in this city, who planted a vine in a very small yard, that grew so large it produced many bushels a year. Almost every owner of a yard in the city could grow more grapes than the family could use. One person in this city sold over $100 worth of grapes from a single vine. Every farmer in the country should possess two or three grape vines, for family use. Care must be taken to keep the vines clear of insects. The Isabella and Catawba grape are the most certain of any sort of fruit grown.

Jas. C. Provoost, a grape grower in Brooklyn, at Green point, said that temperance men need not object to wine, for it would be made of the pure juice of grapes. My land is a loam, with water within three feet of the surface. My vines are on trellises about eight feet apart and some eight feet high. From one vine,

trained on a house, I made twenty-two gallons of wine. In the vineyard I let the vines fall from the top of the frames and take root, and some of the vines appear like a mass of fruit from the ground to the top. I made 1,500 gallons of wine from a trifle over three-quarters of an acre of the Isabella and Catawba. I spread my manure on the surface every year, principally poudrette, and take great care not to pack the earth, even by walking through the vineyard. My oldest vines are eighteen years old. I never disturb the oldest roots, and trim very sparingly. I keep the ground full of roots, growing the vines with roots at both ends. These small end roots I dig up and remove when necessary, but I am sparing of the knife, and do not want the ground disturbed in the bearing season. I am even so careful of packing, that I lay down planks to wheel manure upon. I use clean sand as a top dressing, and consider it very valuable. I am careful in picking the fruit, but after that it is handled roughly, being hauled in a wagon to the crushing vat, where it may be crushed by any sort of machinery. I have used a sugar crushing mill. I add about one pound of sugar per gallon, and nothing else. At the request of some medical men I tried the experiment, last fall, of making pure brandy. If I use pure juice it takes five gallons of wine for one of brandy, which would make it too expensive. But in wine-making there are the grape skins and the lees of the wine casks and wine that could not be bottled without filtering, all of which can be distilled, and thus make the business profitable, and yet give the public a pure article. There is nothing but the pure grape juice in my wine or brandy, except the sugar. No alcohol is added. And such wines as I make, and they have certainly been highly approved and have taken first premiums, I can sell at the following rates, which afford such a profit that I am only waiting for a location to extend the business of grape growing:

Price of Wines.

Three years old, on draught, per gallon	$2 00
In bottles, per dozen	9 00
Five years old, on draught	3 50

Five years old, in bottles, per doz....................$12 00
Ten years, on draught.............................. 6 00
Ten years, in bottles, per doz...................... 18 00

Pure brandy I can sell at $8 a gallon. There is no doubt that all the clay land on Long Island can be profitably planted in vineyards.

Mr. Provoost then exhibited samples of Catawba and Isabella wine, which proved very delicious, having a true wine flavor, but some of the tasters thought it "lacked body." Probably because it lacked alcohol. The brandy, although new, and a little fiery in consequence, appeared about the best domestic article we have ever seen. Doubtless it can be relied upon as pure for medical purposes.

The Chairman said he raised many lambs by having the young first fed from the mouth of one of his shepherds with a raw egg.

The practice of scalding certain hard and horny seeds before planting, such as cranberry seeds, locust, and the like, was discussed.

Subjects for next meeting "Strawberries and markets."

Adjourned. H. MEIGS, *Secretary.*

April 12, 1858.

Present—Messrs. John Campbell, President Pell, D. C. Robinson, Paine, Provoost, Fuller, Solon Robinson, Lawton, Barney, Judge Scoville, Silliman, Pardee, Livingston, Dimond, of Michigan, and others.

Mr. Pell in the chair. Henry Meigs, Secretary.

The Secretary read the following translations, extracts, &c., made by him, viz:

[Bulletin Mensuel de la Societe Imperiale Zoologique D'Acclimatation. January, 1858.]

ON THE WILD YAK AND SOME OTHER ANIMALS OF THIBET AND INDIA.

[Note by Mons. Robert Schlagintweit.]

I have the pleasure to reply to some of the questions which you have addressed to me, please accept what I have learned, little as it is, for my observations are not yet concluded. The hygrometrical condition of Thibet varies very little with the ele-

vation of lands; for instance, at a mean height of 3,900 metres (nearly 14,000 feet) in September, as an approximate medium of the year, the temperature varies at 9 o'clock A. M. from 14 to 16 degrees (centigrade probably), equal to Fahrenheit 57 to 62 degrees. In winter the dryness is somewhat less. In this region the fine wool goat (duvet normal) is found at an elevation of from 2,500 to 3,000 metres (from about 8,000 to 13,000 feet). The diminution of temperature of one degree, centigrade, corresponds with a difference of height of 180 or 190 metres (570 to 580 feet), the variation of moisture being small.

The yaks of the pure breed, which are not like the dehoubous, crossed with the zebu of the Indies, go on these mountains as high as nearly 18,000 feet. The yak is one of the animal kingdom most acclimated to cold, and to very low atmospheric pressure. The yaks of pure blood descend during winter to about 5,000 feet elevation, in the Bantlin, for a few weeks only. They cannot exist in the humid parts of the Himalaya mountains. Experiments with them have been made at Simla, Dant, Jiling, &c., and failed. The drought of the region of the wild yaks is extreme, much greater than that of the fine wool goat. The dehoubous always cross well with yaks and buffalos or zebus, which live in the warmest regions, but suffer when the humidity is greater than it is in the temperate parts of France.

Note.—The existence of the yak (or Thibet ox), as wild, has been often doubted, but we have frequently found them wild, chiefly on those slopes of mountain chains which separate the Indus of Sutleges, near the sources of the Indus and the environs of the Gastok, but the greater numbers are found at the foot of the northern slope of the chain of Karkoram, as well as in the south of Kuenluen in Turkistan, in western Thibet, particularly in the Hadak. The true yak can hardly exist at 8,000 feet elevation in summer. We have found large herds of them at over 18,000 feet elevation, and we have found some as high as 19,500 feet, far above the limits of vegetation, and more than 1,000 feet above that of the snow.

The hybrid of yak with the Indian cow is called choobou. It is remarkable that these are most useful to the people of the Himalaya mountains.

The kiang, or wild horse, is often confounded with the gorkkar, or wild ass, but the kiang lives in the high cold regions of the Thibet mountains, and the gorkkar in the warm sandy regions of the Sind and of Belouchistan. The kiang is found in large numbers nearly in the same localities as the yak; we have not found them over 18,600 feet. The region where they live is one of the most interesting and remarkable upon our globe; although free from snow in summer, these regions are deserts the whole year. Their vegetation is less than that on the desert between Suez and Cairo of Egypt, but, nevertheless, numerous troops of large quadrupeds, besides those we have mentioned, are found there, and also numerous kinds of wild sheep, antelopes, and a small number of the dog race, of foxes and hares. Dr. Barth says to me recently, that he considers the asses he saw in Africa as identical with the gorkkars of the Sind. I will now endeavor to explain the history of the fabulous licorne (unicorn). It has been described by those celebrated travellers in eastern Thibet, Messrs. Plue and Gabet. On a wild sheep is found, *not one horn*, but a double one enveloped in a sort of sheath, resembling *two fingers* in one *glove finger*.

After the reading of this paper Mons. Kaufmann stated that attempts have been made in Prussia by our affiliated societies to cross the ass with Asiatic pure blood stallions, but have not yet succeeded.

EGYPT AND HER PROGRESS.

His Royal Highness Prince Halim, to whom we are grateful, extends our views there. He is governor of Soudan for his brother the viceroy, and has formed at Karthoum, a thousand leagues south of Alexandria, a committee of acclimation. We have in Marseilles and Paris specimens from him of the breeds of oxen and sheep of Soudan, he is seconded by our devoted associate His Excellency Kœnig Bey.

A NEW REMEDY FOR THE POTATO ROT.

Solon Robinson—I hold in my hand an article from *The Leeds* (England) *Mercury*, which I will read, as it gives an entirely new theory for the prevention of the potato disease, so easily tried that

I hope every person present, and who may read this article, will try the experiment.

The condensed facts of this new preventive are these: Some years ago, some boys engaged in the field of a farmer in Belgium, amused themselves by inserting peas into the seed potatoes they were set to plant. In due time both peas and potatoes grew together, producing an unusual yield of peas, which being gathered, the potatoes were allowed to ripen, and upon digging proved entirely sound, while the same sort in other parts of the field were badly rotten.

John Jackson, of Leeds, in his letter to *The Mercury*, says:

"Mr. Joseph Bower, chemist, of Hunslet, had read the account in the papers, and informed me of it. For some time before I had paid a good deal of attention to the subject of the potato disease, but my inquiries had certainly not gone in that direction. Immediately, however, I set to work, to endeavor to find a solution to the new problem. I submitted many samples of diseased potatoes and of sound potatoes to careful chemical analysis, and I invariably found that the diseased potatoes, as compared with the healthy ones, exhibited a marked deficiency of nitrogen and of nitrogenized matter in every instance, and also a great deficiency as compared with the published analysis of the potato, by Liebig and others, made some years before. From that result, then, I inferred that the potato was set inherently deficient in nitrogen, but being inoculated with a substance intrinsically rich in that element, as peas are during the mutual decomposition and chemical changes of the two substances in the process of their germination and growth, sufficient evolution of nitrogen from the pea would take place, and being absorbed by combining with and supplying the deficiency of that element in the potato, communicating, as it were, its equivalent in that way, would counteract its tendency to disease. I then tried the experiment practically. I obtained potatoes of several kinds for sets whole; and then took peas, Bishop's dwarfs), and inserted four or five (according to the size of the potato), deep in the fleshy part of the set, taking care to avoid the eyes. I then planted them in my garden at Hunslet, in the usual way. Mr. Bower, and several other gentlemen at

Hunslet, will well recollect watching with great interest the growth and development of the compound crop. The result was perfect success. I had a very extraordinary yield of peas. When the potatoes were taken up, they were a large yield, with a very few small ones, and every potato was healthy and free from every trace of disease. Those potatoes were laid on a wooden floor in a room in my dyehouse, where they remained all winter until the following spring; they were then examined, and found to be all sound and healthy, and were employed as sets again in the same way, with the same result."

Mr. Robinson also read another letter upon the same subject, from Wellsboro, Tioga county, Pa., which lays down the following axioms:

"1. The kinds of potatoes in most general cultivation have rotted first and worst. 2. There is no variety but will rot, if cultivated in the same locality several years in succession. 3. Potatoes started from the seed balls, and not grown on the same land more than two successive seasons, will not rot, if the ground be tolerably dry, and no water allowed to stand in the hills. 4. Potatoes grow more mealy, and of a better size, by being started from the seed as far north as 45° or 46°, and worked gradually southward—not being grown more than two or three years at most in any one locality. A small, soggy red variety, started in Northern Canada or Minnesota, and worked to the south gradually, will, by the time it reaches Long Island or New Jersey, have become a mealy prolific potato."

THE STRAWBERRY QUESTION.

The Chairman called up the question of strawberry culture, and asked Mr. Pardee, author of a useful strawberry manual, to give his views upon Peabody's seedling. He said that Peabody's had not generally succeeded at the North the past season, but he hoped it would be better the present year. He spoke very highly of Wilson's seedling, which is a staminate, or male plant, and needs no other kind for a fertilizer. It is not a very high flavored berry. Hooker's seedling is very fine flavored, but not so productive as Wilson's. Hooker's is nearly as excellent as Burr's

new vine, and much more prolific. Longworth's prolific is an excellent variety. I would set strawberry plants as early in the Spring as possible, pulverizing the earth very fine eighteen inches deep. I would put upon a bed twenty feet square the following ingredients: one bushel of unleached ashes, one peck of lime, and two quarts of salt, thoroughly worked in the soil; and when I set the plants I would put a plank on so as not to tread down the soft earth, and never let the bed be tramped afterward. I would mulch the ground with tan-bark, or leaves, or salt hay, and never dig between the rows. I believe strawberries can be grown at a cost of fifty cents a bushel. The great error in strawberry culture is to allow vines to grow too close together. They never should be permitted to grow nearer than one foot apart, and never be manured highly, nor dug between during the bearing season so as to injure the small roots of the plants. The roots, too, must be kept moist. One plant has produced 260 berries in one season.

Mr. Lawton—One of the most important things in agricultural pursuits is adaptation. It may be seen by the account of these animals that they are not adapted to our purposes, however well they may be to the region they inhabit; and it should be our aim in all our remarks here, and we should hold this point steadily in view—adaptation in all things. Grapes may flourish well in one locality, yet may be very poorly adapted to other localities, and so of many plants and animals.

GOOSEBERRIES.

Solon Robinson read from a letter the following extract:

I would first call your attention to the blight or mildew of the gooseberry, which may be prevented by spreading liberally under the bush horse manure. This should be done early in the spring.

Mr. Fuller, of Brooklyn—This horse manure mulching will not answer. Salt hay is much better. Our native varieties, too, are much less liable to disease than any other from abroad. We can also improve the native variety; and certainly we should grow gooseberries enough to make our own champagne, since much of that imported is made of this fruit, without a drop of grape juice.

Wm. Lawton—A Mr. Shaw, many years ago, assured me that all varieties of gooseberries can be grown in this city or country without disease. I have pursued his mode, and do grow fine berries. The wood never should be left over two years. The best way is to train down branches and get new roots, and cut away all the old wood. Cold loamy soil is the best, and never use heating manures. I use fresh cow manure, so spread over the earth twice a year that it serves as a manure and as a mulch. Gooseberries are not always subject to blight, and with proper culture in a cool soil, kept moist, the finest English berries can be grown successfully. I have watered with weak salt water, and found a good result. I cut away, this spring, half the wood from my bushes. Swamp muck and mulching is valuable for gooseberries and all other berries. Stones placed around all small fruit trees and bushes is highly beneficial.

Mr. Fuller—I use charcoal dust for all red or redish fruit or flowers with great advantage. It enlarges, sweetens and hightens the color of fruit. There is nothing like cow manure for fruit trees. It is that and old sods that produce the finest orange trees sold in our market.

Mr. Pardee—The Albany gardeners are unusually successful in growing gooseberries; they use hog manure, covering the ground two or three inches deep. We can't over feed gooseberries, currants or roses. Strawberries may be ruined by over manuring. I have used salt water upon gooseberry bushes with advantage. Some of our seedling varieties and improved natives are very excellent and productive. An ornamental hedge can be made of wild gooseberry bushes, and afford an abundance of fruit that makes good pies.

Mr. Fuller, of Williamsburgh, observed that there were forty varieties of gooseberries. They love a cool position and a heavy soil, in which they are not liable to mildew.

TO KEEP MOTHS OUT OF BEES.

J. M. Dimond, Eaton county, Michigan—I suspended my hives by wires, and thus saved the swarms from moths. The hives were suspended about three-fourths of an inch above the bench.

TRANSPLANTING CABBAGE.

Mr. Eaton inclosed the young plant with a dry forest leaf rolled up, and the small end inserted in the earth, so that the plant stands as it were in a cup made of a leaf, and this keeps off all attacks of grub worms.

Solon Robinson suggested that the same plan will probably save the young plants of melons, &c., from being destroyed by bugs.

MILDEW ON GRAPES.

Dr. Underhill—Any kind of mulching is good to prevent mildew. A gale of wind don't injure grape vines—they need a free circulation of air. A vineyard on a hill exposed to the wind is not likely to be injured by mildew or insects. A vineyard must not be inclosed with a tight board fence or anything else to keep off the storms. Let them come, and the winds blow their full force. The want of free circulation of air in cities is the cause of so many failures. The best plan is to train single stalks up to the roof, and then cover an arbor, where the grapes will grow in great perfection—the roots growing under the pavement of the back yard.

Wm. Lawton—Almost any tree roots will grow and perfect the tree and fruit, when entirely paved over with brick or stone. No one need be without fruit who has a foot of earth in which to plant a young vine.

Solon Robinson—A letter writer wishes me to call the attention of the Club to the following fact:

"Cows are very fond of the leaves of sugar maple, but their effect upon the quantity of milk is bad, as they cause them to dry fast, therefore milk cows should never be allowed to feed in lots when and where the maple trees are shedding their leaves."

J. M. Dimond, of Michigan, confirmed this theory by stating that he had noticed that his cows always failed of their milk when running in pasture or woods where maples grew, at the time of the falling leaves, though he had never before heard the cause assigned.

The Club adjourned. H. MEIGS, *Secretary.*

April 19, 1858.

Present—Messrs. R. L. Pell, Wm. Lawton, Solon Robinson, Horace Greeley, R. G. Pardee, John G. Bergen, Judge Livingston, Dr. Wellington, Mr. Culver, Mr. Fuller, Mr. Bartlett—forty-three in all.

R. L. Pell, President of the Institute, in the chair.

Mr. Lawton—Our permanent secretary, Mr. Meigs, is absent to-day on account of indisposition, I therefore move that Mr. John W. Chambers be appointed secretary pro tem. Carried.

Wm. Lawton, of New-Rochelle, said: The Farmers' Club of the American Institute is not a miscellaneous or informal meeting, but a branch of the Institute, and the proceedings are published and distributed all over the world, so that suggestions thrown out here are not alone for the ears of those who attend the meetings, but for those who may read the proceedings many years hence, as they are preserved in the bound volumes of the Institute's Transactions, beside in the daily journals.

The President said, I have a few remarks to make upon miscellaneous subjects:

I am always amused when I hear my agricultural friends complain that their potatoes rot, and that their wheat and rye crops would have been exceedingly fine if the severe winter had not destroyed them through the medium of excessive frosts; that their corn fields would have presented a magnificent appearance, if the spring had not been so wet as to have prevented early planting, and the continuous rains so detrimental in causing the kernels to decay in the ground; that their ground is clay, and cannot be tilled sufficiently early to mature their crop. Now the fact is, if potatoes rot, and crops fail, summers are too dry and winters too cold to suit the taste of the farmer, it is his fault, as by proper draining, not only low land, but high, may be made to produce remunerating crops, independent of the season, whether it be dry or wet. All lands require draining, whether situated on high hills, or in low valleys; no farmer can raise a crop of wheat, rye, corn or potatoes, on wet lands, and all farms are more or less so. You must not consider your lands dry because they crack open in mid-summer on the surface; this is no indication

that they do not require underdraining, that the subsoil is not wet. Please to remember that the water caused by rain, and snow, which falls in our country annually, is ample to cover it to the depth of at least three feet; what becomes of this immense amount of moisture? how much of it percolates through the soil? how much enters into the constitution of growing crops, or evaporates into the atmosphere? Who knows? Under all soils, near or remote from the surface, there lies a strata of clay, hard-pan or rock, impervious to water; the rain drops sink by gravitation, until it meets with one of these substances, and there lies for many a long day, causing all the said complaints we hear about unpropituous seasons, potatoe rot, wheat failures, &c. Blame yourselves instead of Providence, for nine times out of ten, if your crops fail, it is your own fault. You sow carrots, parsnips and beets, in undrained land, and you find their roots spread instead of running down, and your crop is a failure. Then, instead of attributing the loss to your own negligence, you find fault with the elements. How much better would it be to make drains sufficiently deep to carry off all the stagnant water, and make room for the ready escape of rain when falling in excess, and at the same time arresting the ascent of cold water by capillary action from springs beneath, containing frequently noxious matters, always more or less abounding in undrained land, ready to impair the growth of all deep rooted plants. When rain water falls on thoroughly drained lands, it carries fresh air with it from the surface, at least to the bottom of the drain, refreshing the earth with moisture, and aerating it at the same time, making it loose, sweet and friable, causing hard lumps to crumble into substances adapted to permanent fertility, and ready to receive artificial manures. The farmer who applies those invaluable enrichers, wood ashes, bone earth, nitrate of soda, lime, &c., to undrained lands, actually throws them away. Whereas, if placed upon well drained soil, he will obtain an adequate return, and feel encouraged to proceed in devoting his money to the permanent amelioration of his farm. You cannot make your soil too deep; the roots of luzerne will extend thirty-two feet into a dry, well pulverized bottom. Last summer I followed the root of a horse-

chestnut tree nearly one hundred feet, running horizontally two feet below the surface to a manure heap, without a single lateral fibre. To show you the superior advantage drained lands have over undrained, last spring I plowed, harrowed, manured and sowed oats on a thoroughly drained and sub-soiled field during a long drizzling rain storm, and harrowed it during a heavy rain, without injury to the land, and the crop grew finely, and yielded well. The contiguous undrained field at the same time was covered with water, and I was unable to plough it in two weeks after. I have, on several occasions, saved my corn crop on drained land in a perfectly ripened state, when I have lost it on a contiguous undrained field, planted at the same time, and can assure farmers that they will never be compelled to complain of their wheat or rye field being winter-killed or frozen out, if their fields are well underdrained and sub-soil plowed ; nor will they be subject to the potato rot. I plant large fields annually, and have never had the rot on my farm, nor do the potatoes decay after being pitted or housed.

Well drained lands defy drought, from the fact that being pulverized they absorb and retain moisture much longer than undrained land, and the temperature is on an average 14 degrees warmer than undrained. Corn will not vegetate unless the soil contains 56 degrees of heat, and invariably rots at 46 degrees; this is the case with many seeds. The sun has an immediate effect upon a drained soil, and will raise the temperature in it to nearly 100 degrees, when there will be no heat administered to the contiguous undrained wet land, as it cannot descend. Place water in a pot, and apply heat to the top, and you will find that it will not become hot; fill the same vessel with ice, and place on it one thickness of letter paper filled with boiling water, and it will not melt the ice. In draining land I find great advantage in leaving my drains open at both ends of the field, so that the air may pass through and ærate the ground. In several experiments the difference has been one-half in favor of this practice on muck land, as it supplies oxygen in large quantities; when this is excluded the vegetable compounds in the soil must obtain this element from any earthy substance that it is capable of decom-

posing, as it is indispensable to the health and rapid germination of all seeds. When nature desires that seeds should not germinate, it is only necessary that she places them beyond the reach of oxygen, and they will remain buried for centuries without the least sign of life.

I do not wish to be understood in any remark that I may have made, that the influence of warm, dry, wet or cold seasons may be entirely overcome by good husbandry, but that the intelligent agriculturist will have a fewer number of failures to lament than the one who makes no experimental research after science. A change of seed has been generally recommended, but as every seed that grows has a peculiar climate and soil adapted to it, in which it flourishes finely, without showing any sign of degeneracy, and as long as this state of things last I would on no consideration change my seed. I sometimes, by an arrangement of the soil, change the constitution of my plants, and find they transmit it to those coming after them; for example, if you desire a certain seed to produce a plant that will come to early maturity through many generations in any kind of land, propagate it in a warm, rich sandy soil, and it will not disappoint your expectations; or if you wish the same seed to produce a plant that will mature late, sow it in a cold stiff clay.

All agricultural writers say, sow a small portion of seed on rich ground, and a large quantity on a thin soil. I have always pursued a contrary course, and sow the large quantity on rich ground, which causes every seed to grow and throw up a separate stalk, bearing grain; whereas, if sown sparsely, half the seed is prevented from growing by the advance of the strongest seed, which litters and covers the ground with weak shoots, producing a medium yield. And a thin soil is not capable of sustaining a large quantity, but can usually nourish a small quantity and perfect it. In general I would recommend a liberal allowance of seed; for instance, wheat three bushels to the acre on rich soil, two bushels on thin; rye, oats and barley the same; clover one bushel to the acre; timothy half a bushel; potatoes fifteen bushels cut, thirty bushels whole. If you attempt to grow any species of plant that requires either potash, soda or lime, except on soils

abounding with those substances, they can never be developed. The reason why the pine tree grows, in preference to all other trees, on the worn out lands of Virginia, is, that the salts of potash have been removed by the tobacco culture, and pines requiring less than other indigenous trees, flourish.

All plants must have a definite quantity of heat from the commencement of their germination to the end of their organic activity. On the banks of the Nile, barley is sown on the first of December, and is harvested in ninety days. The mean temperature during that period is 69° 48′. In Tuqueres, nearly under the equator, they sow the last of May, and harvest on the fifteenth of November. The mean temperature of this growing season, (168 days,) is 50° 12′. At Bogota, the growing season requires about 123 days, and the mean temperature is 57° 24′. The same results have been obtained with wheat, corn, rye, potatoes, &c. From this statement we deduce the fact, that all plants require a certain quantity of heat for their development; but it does not matter whether it is distributed over a long or short space of time.

There was a period when the temperature throughout the world, from pole to pole, was uniform, as is conclusively proved by the growth of plants; as discovered in the coal formations. This was called the carboniferous era. And as the carbonic acid gas was consolidated into coal, great changes were uniformly impressed upon the atmosphere, and our numerous climates were formed under the influence of the sun. Then animals and plants became localized within certain temperature barriers, each having its own special fauna and flora. Those of Africa are distinct from Europe; Europe from America, and America from New-Holland. And what is more remarkable still, the variety of man is homogeneous with the flora and fauna. The Africans are black, and originated, probably, from a lusus naturæ, as do the Albinos; the Mongolians yellow, Europeans white, and Americans red. The coloring matter in the skin of the three last named, is so slight that it is probably developed by the influence of temperature and climate operating upon the liver, as it grows dark toward the equator, and light toward the poles. We

all owe our origin to one common parent, Adam, as is proved from the fact, that all mankind, throughout the entire universe, are the same. The skeletons of all races of men, when examined, are found to contain two hundred and forty-six bones. The bodies of all men are liable to be attacked by the same diseases. They live the same length of time; their pulse, respiration, and temperature of body are all the same.

And what is more conclusive still, all the tribes of the human family believe in an unseen future existence. All men pray; all men believe in the sanctity of the burial place. Men believe in ghosts, witches and sorceries. An innate belief in futurity was shown by the American savage, who always spoke of the undisturbed hunting ground that he was to inhabit after this life was ended. The Arabian imagined that he would go to a paradise filled with houries, whose society he was forever to enjoy. The Esquimaux' heaven is supposed by them to abound with the blubber of whales. The people of Asia were the first to believe in God. Asia gave birth to the greatest lawgiver that ever lived—Confucius, whose maxims have stood more than two thousand years, and been adopted by three hundred and fifty millions of men; to the greatest king, Tamerlane; the greatest general, Genghis Khan; the greatest astronomer, Ulug Beg, who determined the latitude of Samarcand, with a quadrant of 180 feet radius; and made a catalogue of the stars, which was printed by order of the University of Oxford, two hundred years after. Caliph Al Maimon determined the obliquity of the ecliptic, explained the nature of twilight, and the importance of allowing for atmospheric refraction in astronomical observations. The figures of arithmetic and algebra. To whom are the human family indebted, if not to him.

I often hear my agricultural friends discuss birds and insects, both of which they think should by all means be exterminated, and still they are both indispensable to man. In fact, he could not exist were it not for birds, upon whom alone he can depend to protect him from injurious insects and reptiles ; but birds can exist without man. Men are prone thoughtlessly to destroy eggs, not recollecting that from an egg all men, birds and insects

spring; the mothers of all living things are cradled in an egg, and from her the destiny and diversity of all are derived; this is the grand starting point for all insects, animals and vegetables. It behooves an agriculturist never to destroy an egg, unless he well knows to what it belongs. An ignorant gardener when he finds cocoons on the bark of his fruit trees, immediately rubs them off; they might, if left to nature, have produced the very useful Ichneumouidæ, one of man's best friends, of which there are twelve hundred varieties; they destroy myriads of insects that injure our orchards, woods and cereals. We make war upon mosquitoes and fleas; they are useful to man, as they prevent him from becoming inactive, stupid and resigned to slothfulness. We destroy ants when they enter our houses; this is working directly against the beneficence of nature, as they would not come except to annihilate the ova and offspring of cockroaches, crickets and other auxiliaries of a similar nature that they esteem, and after having performed that duty, invariably retire to their associations for the purpose of preserving, multiplying and providing for their kind. Ants hold an interesting and prominent position among insects, as they certainly present high traits of animal instinct, and like the honey bee exhibit life in an amiable state of harmony. They are both highly endowed and educated as architects and artists. The ant is more particularly celebrated as an educator, and the honey bee as a geometrician. The ant is republican, and the bee monarchial, being governed by a queen reigning over a family of virgins. Spiders are likewise entitled to consideration, as they are constantly employed putting an end to the existence of the troublesome fly; they are said to be edible, and taste like nuts. Man derives important and immediate advantage from many insects. Bees furnish honey and wax. The silk worm clothes, gives occupation to, and, consequently, food for thousands of mankind. Gadflies, by puncturing the oak to deposit their ova, produce an excrescence which furnishes us with gall nuts, essential to dying. Cochineal is produced by an insect called coccuscacti. The cantharides, or blister flies, are essential to the healing art. Insects accomplish the fructification of different plants. Many amphibious animals, mammalia, birds and fishes,

live on them, and thus preserve the balance in the economy of nature's laws. They are generally repulsive, cause fear, and create anxiety in proportion to our ignorance, but still they are nearly all perfectly inoffensive. We call them little insignificant things, yet their insignificance is infinity—they constitute a world inconceivably powerful. Who has not gazed on the mighty ocean at night, when illuminated with billions of imperceptible animalcules? Who, after enjoying such a scene, is not filled with admiration and amazement at the mighty fecundity of nature. Think of the mollucs, who are neither more nor less than the constructors of the world we inhabit; they, as agents of the Deity, have prepared with their remains the soil we cultivate. They have passed by decomposition into the state of marble or limestone, and constitute the basis of a large portion of the crust of the earth. The smallest creatures in existence have produced the greatest results. The thezopode, invisible to the naked eye, has raised a monument to itself, consisting of Central Italy, and a large proportion of the Appenines, and a large portion of the vast cordillera of the Andes. It would require one hundred and eighty millions of these insects to weigh a grain. In our times we know that the calcareous polypi, corals and madrepores, create islands, nay, whole archipelagoes. There is nothing but beneficence and wisdom in the usual manifestations of insects, if properly understood. Even the persecution of our domestic animals by flies, constitutes one of the principles of their safety. If these little persecutors did not thus stimulate them, they would remain in a stupid and resigned state until death overtook them. But driven by flies, they seek running waters, and thus reach salubrious places. Nature provides the tsetse for some similar and judicious purpose. The dragon fly and cicendelæ destroy thousands of destructive insects daily. There are other auxiliaries to agricultural pursuits, that man makes war upon; the worms which cleanse, digest and renew the soil, and the necrophori, that are ever engaged in removing putridity.

Gardeners are frequently exasperated on finding insects in their dahlia roots, when they are really there to remove the dead and diseased parts. It would be exceedingly advantageous to all per-

sons interested in farming, to know how to distinguish hurtful from useful insects. They would not then, as now, be hourly committing violence on the harmonies of nature. The distribution of insect life is in precise proportion to the diffusion of plants. And they form associations for invasion, emigration, defence and pleasure. Caterpillars, when on a march, are guided by a chosen leader. Termites are governed by a queen and king, who have the same lusts for power that human monarchs feel, and like men, they are not born equal, though proceeding from the same description of egg; some of them are soldiers, others laborers, others still gentlemen of leisure. The soldiers often engage in fillibustering battles, set sentinels, make marches and countermarches, send for reinforcements, if necessary, and, if any soldier sustains an injury, the most devoted attention is shown to him. I have seen a catterpillar make a ladder from the top of a cabbage to the ground, and go up and down it. Some insects use a species of stone, and build houses with it; others make a substance similar to pasteboard for the same purpose; some cover the interior of their abodes with a silken fabric, and hang their doors with hinges of silk, so constructed that their weight will close them, and if attacked barricade them within, thus mimicking the arts of man.

With regard to birds, our Southern cities would not be habitable were it not for the vultures that make clean, and purify their streets; birds of this group are cowardly, and live on dead carcasses, and offal. When gorged a fœtid humor is discharged from their nostrils, and the bird becomes perfectly stupid.

All warm climates are principally indebted to storks, cranes and other similar birds for their salubrity. Morning and evening, at the North, we find the air completely filled with winged insects, and were it not for the arrow darting swallow, they would annoy us exceedingly. What could save our roses but the insect destroying wren; our grain, the tom-tit and cat bird; our garden vegetables, the sparrow and yellow bird; our meadows, the bob-o-link and robin; our trees, the woodpecker and cuckoo. The king bird protects our farm yards from the attacks of hawks, and other birds of prey, such as the eagle, vulture, &c. I have seen him follow a hawk for more than a mile, constantly attack-

ing him with serious blows on the top of the head, and finally destroy him. The orchard oriole, is constantly engaged destroying the pernicious bugs that eat our strawberries and raspberries, and though he occasionally partakes of an inviting berry, his principal reliance for food is on our enemies. The ignorant gardener not knowing this fact, makes an attack upon him, whenever he appears. All farmers make war upon, and use their best endeavors to kill the common crow, which I consider one of the most useful of all birds, and protect with the same care that I do the barn yard fowl; he gratifies his appetite occasionally with a few kernels of corn, fruits, and seeds; but the principal occupation of his life, is the extirpation of lizards, toads, serpents, grubs, worms, injurious insects, carrion, raccoons, owls, and foxes, and if treated kindly, becomes tame, and will then protect a large farm from the annoying depredations of the eagle and hawk, and not unfrequently alights on the backs of barn yard cattle, for the purpose of relieving them from the insidious attacks of nameless insects concealed in their skin. Then we have the omnivorous blue-jay, which feeds without discrimination upon all kinds of flesh, insects and seeds; he is a sneaking coward, and never molests any other birds, even if far inferior to him in strength, but during their absence, steals their eggs, and devours their young, and if disturbed flies to cover, crying vociferously; he destroys innumerable small insects, and destructive beetles. The Butcher bird is active, courageous, and possesses indomitable perseverance; he is probably less destructive to agriculture than most other birds; is lively, noisy and perfectly fearless of man. I have watched their movements with great interest, and find that they breed but once a year and keep their young with them during the first winter; while young they feed them upon insects, caterpillars, spiders and small fruits, and before they leave the nest, upon the flesh of small birds, which, I have seen them take thus: They embower themselves in a bush, and imitate the cries of distress of any bird they see approaching. When allured sufficiently near, he is caught and torn in pieces; the portions having feathers on, are eaten by the old birds, and the balance fed to their young. I have seen them attach insects to the thorns on the honey locusts, and when small birds ap-

proached to eat them, they have been seized and carried off. I once caught one, and was bitten, and scratched so severely, as to be pleased to let the creature go. Insectivorous birds are occasionally graminivorous, I will allow, and feast on our grain and fruits, but the injury they do, cannot be compared to the benefit.

A farmer, will only be truly a farmer, when he seriously sets himself to work to discriminate between the birds and insects, that injure, and serve him; he may then gather together, in one harmonious whole, all living nature.

Solon Robinson—We have discussed the potato question to some extent lately, and I hope profitably. Last week I read an article from a Leeds (England) paper, which stated that peas inserted in the tuber before planting would produce an increased crop of peas, and wholly prevented the potato rot. Now I will read from the letter of K. K. Kenney, Lorraine county, Ohio, published in The Ohio Farmer, April 17, the following extract, which gives some valuable information in relation to seed potatoes. Mr. K. says:

About the first of last May I selected a small piece of ground, made it very mellow, and planted it with care in the following order:

First, two rows of six hills each, with pieces from medium-sized tubers, each piece having one eye, and four pieces in a hill. Second, do, with whole medium-sized tubers, one in each hill. Third, do, with eyes having very little of the tuber attached, four in each hill. Fourth, do, with small tubers, four in each hill. Fifth, do, with eyes from the seed end of each tuber. Sixth, do, with eyes from the stem end of the large tubers. Seventh, do, with small, unripe tubers, taken up while quite green on purpose for trial.

At digging time the following was the result:

No.	Weight of seed. lbs.	oz.	Average No. of tubers in hill.	Average weight in 12 hills. lbs.	Yield per acre. Bushels.
1........	1	9	9	$23\frac{3}{4}$	150
2........	3	1	$10\frac{1}{2}$	30	160
3........		5	$8\frac{2}{3}$	24	128
4........		14	15	31	165
5........	1	2	$10\frac{1}{2}$	34	192
6........	1	12	$12\frac{1}{2}$	$42\frac{1}{2}$	218
7........	----		$5\frac{1}{2}$	$27\frac{1}{2}$	148

I do not suppose that the same result would always be obtained, but this, being from actual experiment, is of some little value. Those who advocate the planting of eyes, as in No. 3, usually dry them; mine, however, were not dried, but planted when newly cut. No. 7 would probably compare better in a dry season; the vines were altogether more vigorous, and apparently more healthy. I also drew some young vines, as is usually done with the sweet potatoes, and transplanted them; from these I obtained beautiful tubers of nearly equal size. This suggests the idea of forcing the potato in a hot bed, and transplanting when all danger of frost is over, thus securing an early crop. The variety used was the Neshannock.

Prof. Cassels compares the tuber to the scion of a fruit tree, and the eye to a bud, and concluded that it was not good to plant small tubers, because they sent up so many small shoots. His comparison I like, but not his conclusion. A scion or twig of last year's growth, that is weak and small, is not apt to send shoots from the buds on the side, but only from the terminal bud. If a scion is taken from the parent stock, and properly divided, and these pieces well inserted in another tree, each bud will make a shoot or limb. I have known nurserymen who always rejected the upper portion of the scion, because they think it weak. So with the small potato. The terminal buds or eyes are often the only ones that start at all. Of forty-eight tubers planted, I found only fifty-three stalks or vines, and from a quantity of small ones planted, I obtained the same result.

From another trial I found the sprout to do equally well when separated from the tuber, after it had come out of the ground, and had good roots. Small tubers, we see, send their shoots from the terminal buds, which are not so strong as the lateral ones, as we see in the above table, as Nos. 5 and 6 were taken from the same roots, hence, perhaps, it might be well to divest even small tubers of the terminal buds.

Mr. Robinson then said: I once planted potato skins, and found no difference in the yield between the hills planted with skins or whole tubers, and I should like to ask John G. Bergen, a Long Island farmer, whom I see present, how far his experience cor responds with the statement I have read.

John G. Bergen—Nature is always true to herself. An experiment made one year is reversed the next. I have tried many experiments in planting potatoes. The best yield I ever had was from uncut ripe potatoes. I have seen seven hills fill a bushel. My father has dug a peck from a hill. My idea is, that the best plan is to reject the seed end, and cut the other half in two, and plant one piece in the hill, if planted close together. I was at Cornwallis, N. S., last fall, and found the practice was to cut seed as we do on Long Island, and plant closer than we do. They mark the ground two feet apart; here we mark off two by three feet, one piece in a hill. The Mercers have short vines, the Dykemans have long vines. A potato called Peachblow has a long vine, and should be planted wide apart; they have escaped the rot. The main variety on Long Island is the Mercer; they rotted badly last year. The Dykeman, Rockwhite and Alger potatoes are generally used. The Dykeman is an early variety. I never saw a yellow potato as good as the white. I am making some experiments which I will detail at a future meeting of the club.

Horace Greely—Some of the best farmers always plant the outside of the potato, to avoid rot, as the old tuber, in rotting, diffuses the disease to the new potatoes. This is practiced by Major Dickinson, a thinking farmer, of Steuben county.

Dr. Wellington—I once tried a similar experiment in planting potatoes, on a somewhat extended scale, which proved that we may save a pretty large share of the tuber for food. I would cut off the seed end, and divide the other end in two parts.

William Lawton—I have not before thought of it, but now recollect that in all the hills where potatoes rotted most, I found the old tuber in a very offensive condition.

Mr. Fuller—It seems that we do not need many sprouts in a hill, and we do not get many, however many eyes we plant. If we plant whole tubers, one vigorous stalk grows, and we get the same result from a single eye. I would never plant cut potatoes without first rolling the seed in lime, or something to dry up the juice.

Horace Greeley—I still believe that water in the hill is one of the main causes of the rot. If we plant in drained land, or upon

ridges where the water will not stand, the crop will rot less than in wet ground. The theory is that warm rains and a scalding sun produce the rot more than any other one cause, and this seems to be the opinion of The Ohio Farmer, although he says every theory and every preventive of the disease, if successful one year fails the next. Yet I am full of faith that judicious cultivation will do much toward giving us this crop free from the malady that has so long made potato raising unprofitable.

The regular subject of the day being called up, viz: The most economical manner of renovating worn out soils.

Solon Robinson—I did not present it because I had any theory to advance, but because I had received the following letter from Charles S. Wood, a farmer of Penobscot county, Maine. He writes as follows:

I see, in a report of the Farmers' Club, a statement by you that clover seed is the cheapest manure. Now, I have twenty acres of light loam and sandy soil, which I think of manuring, either with clover seed, or "Indian wheat," or buckwheat. Clover seed is worth here: northern, fourteen cents; southern twelve cents per lb.; Indian and buckwheat, seventy-five cents per bushel. Is not the wheat the cheapest if half a bushel will seed an acre? And will not the buckwheat make the quickest and rankest growth for the purpose of manure? Say this before the Club, and let us know the result; for we are much interested in the Institute reports away down here, and they are the first articles sought after in The Tribune. Your grindstone disquisition is indorsed here by all to whom it is read.

Mr. Robinson continued—Now I do not wish to be understood as recommending clover seed to be used as a manure, though I have no doubt it would be a good fertilizer, and so would wheat or corn. And I speak advisedly when I say that wheat bran is worth as much per ton as Peruvian guano, as a fertilizer, of almost any crop. But I said, and say again, that clover seed is a cheap manure if sown with all small grain, and suffered to grow and ripen and be plowed under. And I do think that the best method of renovating worn out soils, particularly such as the writer of that letter describes, is to apply something that will

enable the soil to start a crop of clover, and let that grow to its full size and turn it all under. Certainly, for farmers that have no stable manure to spare from cultivated fields to apply to worn out ones, clover is the most economical fertilizer that can be given. Some outlying fields, too, are too far away from the barn yard, and cannot be manured from that without too much expense. Such should be treated with clover and not pastured or mowed, for nothing is gained in a manurial point of view by passing food through the stock.

William Lawton—I agree fully with Mr. Robinson, that a clover crop is the most economical manure, for it draws two-thirds of its substance from the air. A farmer does not increase his manure by feeding the crop to his cattle. Barn yard manure is only the ashes of crops consumed. If the crops had been turned under, the manurial effects certainly would have been equally great. The material cannot be increased by feeding. There is no doubt but clover is a very cheap manure.

Mr. Fuller—I hope clover and buckwheat will not be classed together, for I have never seen any benefit from turning in green buckwheat; but I have seen positive injury.

John G. Bergen—I plowed under a crop of buckwheat twenty years ago, as an experiment, but I have never repeated it. The first satisfied me. A neighbor plowed in a crop of turnips, and found great benefit from it. I know that clover is always beneficial to land, whether plowed under or not.

Horace Greeley—To plow under a green crop will benefit the soil, but is that the cheapest manure? If bran is as good as guano for land, we should use it. But the question then is, would it not be better to feed the bran to cattle? It may be profitable on some sandy land to turn in crops, but unless nature makes mistakes, that is not the most economical way of making or using manure. I insist that a crop fed to animals, and the manure saved as it should be, will give a more economical dressing.

Mr. Pardee—Practically, the views expressed by Mr. Greeley, are those of nearly all farmers. But in my experience, a course different from that has proved the most profitable. Some of the most successful farmers in this State, and Pennsylvania, are so

from turning under clover. The Germans in Seneca county, use clover with great advantage. I do not think any county in the State furnishes as much clover seed as Seneca county. Crops are not improved for manure by passing through animals.

Solon Robinson—The great question is not whether manure or crops turned under will produce the best result, but which is the most economical. And, in my opinion, that is a question that very few farmers can answer. After all, adaptation must be looked to, because what is adapted to one place is not to another. My only object is to throw out suggestions. I wish those interested to think, not only how to keep their cultivated lands in good heart, but how to renovate the old, worn out fields, and make them fertile.

Wm. Lawton—Most men cannot restore their worn out soils by barn-yard manure, because they have not the barn-yard. And if such soils are ever restored, it will be by growing something upon the ground to turn under, to fertilize the next crop. There is no doubt about the economy of plowing in green crops over that of feeding them.

Horace Greeley—I do not feel satisfied at the reasons given. I don't believe a man can turn under a clover crop near his barn so profitably as to feed it to his cattle. I do not mean that farmer who has not a proper barn-yard. If the manure is to be scorched up and become leached, and the rich juices wasted, such a farmer had better turn it under green. The question is, whether you cannot feed a hundred dollars' worth of clover to cattle, and get half the value of it back in manure.

John G. Bergen—I have always found that plowing in clover that had been fed off close, made the crops richer than by turning in any other grass crop. The roots keep the soil light and rich. Our best melon crops used always to be raised from such land, that is, clover fields that had been pastured or mowed, or both. I believe it is the roots more than the tops that add fertility to the soil.

A large distribution of grafts and seeds received from the Patent office, was then made.

Subject for the next meeting: "Cultivation of the strawberry and other small fruits, and "The most economical manner of renovating worn out soils." Adjourned.

JOHN W. CHAMBERS, *Secretary.*

April 26, 1858.

Present—Wm. Lawton, Dr. Peck, John G. Bergen, Prof. Nash, Solon Robinson, R. G. Pardee, Prof. Mapes, Dr. Ward, A. Nash—65 in all.

Wm. Lawton in the chair. John W. Chambers, Secretary.

MISCELLANEOUS BUSINESS.

The Chairman invited the members present to call up any subject for discussion, or information, they thought proper, during the first hour of the meeting, before calling up the subjects of the day, "Strawberry culture and small fruits," and "The most economical method of renovating worn out land."

Solon Robinson read a letter from M. L. Holbrook in relation to the laws which govern the sex of animals, in which he states that a German philosopher has discovered how he can control the production of the young of all domestic animals, so as to produce males or females at pleasure.

Mr. Robinson also read a letter from a farmer in Cayuga county in relation to the planting of seed potatoes:

For twelve years past we have been in the habit of selecting, for seed, potatoes as near the size of a black walnut (none smaller) as may be, putting one in each hill, and during this time have not had as many as one in fifty affected with disease; except one season, when on digging in wet weather, we tried the experiment of washing them before they were carried into the cellar, when they rotted more at the bottom of the heap. We have usually planted the kind called dooryard or wigdons, and on the same ground, year after year, manuring once in three years. Other varieties have also done well for us with the same treatment. The rot has been so prevalent in the neighborhood that the best potatoes are now worth seventy-five cents per bushel.

Mr. Robinson—I am of opinion however, that the large tubers are best.

The Chairman—Dr. Waterbury I hope, will give us his theory on the subject.

Dr. Waterbury—The tuber of a potatoe is but the continuance of the stalk, or enlargement, and the circumstances of different experiments are so various that it is unsafe to form theories.

Nature has one immutable law, and that is, that like produces like, and therefore perfect seed is more likely to produce perfect fruit than immature seed.

Professor Nash—God, as seen in his works, wonderfully provides for the preservation and growth of the young; and this is hardly less remarkable in plants than in animal life.

The young of animals, whether human or sub-human, either draw their nutriment from the parent, or receive it at the home of an instructive parental Providence.

Every living thing, from man downwards, unless wilfully perverting the laws of its nature, is literally re-creating itself into a living posterity. Every thing that has life, dies, in order that it may live; dies, as to its own individuality, that it may live on and ever in derived individualities. In animals and plants this is alike observable.

The young animal derives its life-blood, its very being, from the parent. It grows by the self-denying, self-exhausting care of the parent. It is so with the young plant. The parent plant exhausts itself in the maturing of its seed. In that seed is the young plant and its food, till it can put forth its vital energies and gather food for itself.

A chestnut falls to the ground, its shell is full of starch, that starch is insoluble; wet or dry, it will remain essentially matured through a long winter. Embedded in the starch is a young chestnut tree. The starch, encased as it is in a shell slightly pervious to water, protects the young tree. It is not food for the young tree, because it cannot be dissolved; and no plant can absorb food except in solution. Diastase, by the genial warmth of spring, is formed in the chestnut. This diastase converts the starch into sugar. It now dissolves; it feeds the young tree; the young tree grows; it thrusts its radicle downwards, and its plumula upwards. Very soon it shows the form of a tree, with roots, stem, branches and leaves. Now it has not changed its form, it has only enlarged itself so that we can see it. It was as perfect a tree while yet in the shell as at fifty years old, but too small to be seen by the naked eye. But out of what does it grow? First, out of the food prepared for it by the parent tree, and then from food obtained from the air and from

the soil, in proportion of ninety-eight or ninety-nine from the former, to one or two from the latter.

It is precisely so with the kernel of wheat, of corn, barley, any seed. The starch is converted, in the appropriate time, into sugar, and affords a pap for the young plant, till it can procure food for itself. I never can believe that the eye or the segment of a potato is as good for planting as the whole tuber, until all the practical farmers in the world are unanimous to that effect. If every one of them, with no dissenting voice, will testify to as good success with cut tubers as with whole, I will yield the point, because I hold that all deductions of science must bow to the experience of farmers. Indeed the experience of farmers, when their testimony is unanimous, is science, of the very highest order, and there is no contradicting it.

It is true that the potato is not a seed. This plant is cultivated from sets, not from seeds. But the tuber is analagous to a seed in one respect; it contains the food for the continuance of itself in a renewed growth. Now although the Creator has caused an abundance of starch in the tuber of the potato, beyond the absolute necessity of the new plant, yet I suppose there is a limit even to the Divine munificence, in any specific exhibition of it. I do not suppose that the tuber contains ten times, nor five times, perhaps not three times, as much pap as its nursling needs. I believe that God has made things right.

Partly, therefore, from a scientific point of view, but more from a thirty years' experience in growing potatoes, and from the testimony of others, as the testimony in favor of whole tubers certainly predominates, I would by all means plant whole potatoes instead of cut. I would plant those of medium size in preference to large or small, though I do not suppose that this preference should be very strong, as splendid crops are often grown both from large and from very small seed; and I would plant one and but one in a hill.. My reasons for preferring one to more in a hill are well known to the readers of the *Farmers' Magazine*, and I believe they are regarded by sensible persons as sufficient.

A friend at Norwich, Conn., has tried anthracite coal ash two years, a handful in a hill, and that saved his crop from the rot.

Yet this is but theory, and may fail in other cases. I once raised a good crop from potatoes of the size of my little finger.

Dr. Waterbury—I look upon potatoes as analagous to hop or grape vines, where we only plant sections of the whole stalk. A potato cut by the hoe scabs over, and is not injured in its eating or growing quality.

Dr. Peck—I look upon this coal ash theory as an important one, and believe they contain a great deal of very valuable fertilizing material. I have thrown such ashes upon grass plots with great benefit. A friend of mine has grown very fine radishes by the use of anthracite coal ashes. The cost of manuring is a very important question, and ashes cost next to nothing.

John G. Bergen—As I am an advocate of cutting the seed potato in order to produce the best crop of merchantable potatoes, I take issue with the theory advanced by Professor Nash. It will be recollected that at a former meeting I detailed my experience made three years since, of the results of planting side by side alternate rows of cut and of whole potatoes; though the uncut tubers produced the most weight in the new crop, the cut ones produced the largest measure of saleable potatoes. As I cut oftenest in three parts, of course there was a saving of two-thirds of the seed in planting. The starch that feeds at first the new plant, is not lost by cutting the tuber; if it is halved, there is half the starch left to feed half the eyes; if planted whole, double the number of eyes producing sprouts require to be fed, and hence the proportion is the same. The potato should be cut in a dry atmosphere, with sun or wind to speedily dry up the wound made by the knife. In that case the juices at once dry on the surface, and form a sac which is sufficient to protect it from all damage it receives after planting. In opposition to the theory of planting small tubers, I may repeat an experiment which I have before related. I selected, a few years since, from a fine crop of potatoes, a bushel of the largest, which I kept distinct from the others, and planted them side by side on the following season. The whole were cut in proper size pieces. The plants from the large seed came up first, grew the fastest, matured earliest, and

made the best crop. Acting on this principle, our best cultivators on Long Island, for early digging, select their potatoes, planting by themselves the largest, from which planting they are enabled to dig their first marketable potatoes. The others are planted in some other location, to be dug later. Of course this applies only when potatoes are dug before they have reached their full size. Many farmers on the island who do not plant over a half a dozen acres, dig and sell their whole crop before the vines begin to decay; and it is common even with those who plant twenty and thirty acres to sell half and sometimes nearly the whole crop before fully matured. The advantages are two-fold; first, they get more money for their crop, and incidentally, less carting; and second, they are enabled to put in a more profitable second crop early than can be raised later in the season. I might add another important consideration, viz: that when dug sometime before maturity they exhaust less from the soil. With ordinary manuring, which is heavy and expensive with us, potato ground improves, and the crop is repeated with advantage for a succession of years without limitation. All good farmers reject the very small tubers. Undoubtedly they may sometimes produce good crops; but they oftener prove failures, and are not reliable. Dr. Waterbury has well said that the wide difference in the results of experiments and consequent opinions, is in a great degree attributable to a dissimilarity ot some of the attending circumstances.

I have had no experience in planting the eyes of the potatoes with only the pealings attached. In the Ohio experiment the smallest yield was obtained from the eyes planted with very little of the tuber connected. Though the old tuber feeds the new plant, and hence may increase the growth and the crop, it is not indispensable to its growth and full development. Sweet potatoes are placed in hot beds to sprout, and when the sets are sufficiently large, they are removed and planted in the drills where they are to grow. This operation is repeated again and again, even sometimes four sets of sprouts are taken from the same bed. This is the exclusive mode of propagating the plants in New Jersey, where immense quantities are raised. The tuber is never

planted. The common potato may be raised from sprouts in the same way, but I think with diminished profit.

Solon Robinson read another letter from Vergennes, Vt., April 19, from F. W. Coe, which states the following theory in regard to preventing the potato rot:

"As soon as the disease manifests itself by the dying of the leaves, go immediately and pull up and remove all of the vines, either to the compost heap or to burn them. If any of the potatoes come up with the stalks, crowd them back into the hill and cover them with earth, leaving them there to mature in quality until time for digging. Dr. Ingham, of this place, says that through his suggestion, the past year, he has witnessed this experiment in some six different cases, and in every case with perfect success, there not being a single rotten potato in the rows thus treated, while the others in the same fields, left as usual, were almost wholly destroyed by rot—and also that the quality of the potato does not appear injured by this treatment."

The letter also stated that it had been noticed that the tubers growing nearest the stalks rotted first, while those furthest removed remained sound.

Dr. Waterbury—The man might just as well dig his potatoes as to leave them in the hill, since they will grow no more after the stalks are removed.

The Chairman suggested that it was probably intended only to remove the diseased stalks.

Mr. Bergen remarked, that that corresponded with a fact connected with the rot on Long Island last year, which was quite damaging and extensive. A local variety called the Algeo, nearly or quite escaped the disease. The seed has been in high demand this year. The tubers on the vines of this variety spread themselves very much through the ground, many of them leaving the hill entirely and are found in some instances nearly two feet from the roots of the vines. They are more troublesome to dig on this account. It is a suggestion that may be of practical value.

Prof. Nash—Nothing can shake my opinion in favor of planting large tubers for seed. In my opinion the want of proper food in the soil is often, if not always, the cause of the potato rot, as well

as poor crops. He then related an anecdote of a neighbor who practiced upon this rule, by using twelve bushels per acre of this mixture: Four bushels of wood ashes, one bushel of shell lime, one-half bushel of plaster, one-quarter bushel of salt. The result was an excellent crop, while, right along side, a crop without this mixture was not worth digging.

Solon Robinson—Here is an important little item if true, which I cut from *The Homestead.* It is stated the following process is practiced in Scotland to preserve potatoes for food:

"Diluted ammonical water in the proportion of an ounce of the liquor of ammonia of the druggist, to a pint of river or rain water, has of late late years been successfully employed for checking the vegetative power of potatoes, and prolonging their suitableness for food. Potatoes immersed four or five days in this liquid, retain all their edible properties unimpaired for a twelve month," improved in flavor and mealiness. The effect of the liquid is to consolidate their substance and extract their moisture. After immersion the potatoes should be spread so as to dry, and will then keep good for ten months; contributing in this way not only to the comfort of families, but also to the health of mariners exposed to long voyages at sea."

The regular subject of the day, "The cultivation of the Strawberry."

Solon Robinson—To open the discussion upon this subject, I ask leave to read the following letter, from Mr. L. A. Brown:

West Haven, Conn., April 9, 1858.

I see at your last discussion that Mr. Pardee makes the assertion that strawberries can be grown for fifty cents per bushel. Now, as I have had some experience in that line, having raised them so as to make the receipts over $1,300 to the acre, at twenty cents per quart, and having come to a different conclusion, I want the proof to accompany such statements, as I believe they can never be fulfilled. Now, if Mr. Pardee can do it, let him publish another book detailing the process, and I will give five times as much for a copy as I did for his other work, and thousands more will do the same. As your next discussion is about

small fruits, I want to inquire about the Antwerp raspberry, whether those who buried the canes the last winter have lost them. Mine are all dead, and so are my neighbors. Have they done so with the members of the Club and fruit-growers generally? They have done so here for the last two winters. What is the cause?

R. G. Pardee—It was simply the result of experience that convinced me that strawberries had been and could be cultivated for fifty cents per bushel, besides the expense of gathering. That cautious writer and experienced cultivator, John J. Thomas, of Western New-York, has also testified to the same fact. An application of large quantities of barn-yard manure will over stimulate the strawberry plant, and it will fail to yield a large crop of fruit. This, however, can be counteracted by an application of eight parts of ashes, two parts shell lime, one part plaster, and half a part of salt, applied to the land, and mixed in a few days before planting.

The ordinary market cultivators, around New-York, obtain only thirty to forty bushels per acre, when a good crop intelligently cultivated, ought to produce one hundred to one hundred and fifty bushels per acre, when every thing is favorable.

Rich land will produce vines, but it will not profitably produce fruit. Strawberry vines are gross feeders, and if upon a soil too rich, they overfeed themselves and bear no fruit.

The Chairman spoke highly of the Alpine variety of strawberries. He said I know that lime is valuable upon strawberry beds.

Prof. Mapes—I have often observed that the flavor of the wild strawberries was superior to the strawberries grown in our gardens. The flavor of strawberries is all in the outside, and hence the small varieties and wild berries are so highly esteemed. Watering beds with diluted tan-bark liquor is highly beneficial. All inorganic substances are better than animal substances for manuring strawberries.

Mr. Bergen asked if other lime would answer as well as oyster-shell lime?

Mr. Pardee—Other lime will probably do as well as oyster-shell lime. I have tried many experiments with wild strawberries, and so far as possible, have proved by several persons of careful judgment that some of the cultivated varieties are very superior to the wild berries. I do not consider any crop a good one that produces less than one hundred bushels to the acre.

Prof. Mapes thought the wild strawberries in his garden were no longer the wild ones he alluded to. I am satisfied about the excellence of the flavor of wild strawberries, when growing wild, particularly those growing on the Catskill mountain. If the gentleman would go to the Mountain House and eat the wild strawberries brought to the Hotel by the children, he would change his views on the subject. The dining room was fragrant with the perfume.

Prof. Nash—I have eaten the best strawberries that I ever ate from wild vines, and I believe great mischief has been done by recommendations for high manuring. Leaf mould or swamp muck is the best manure that we can use, and it will bring a greater crop of strawberries than high manuring.

Mr. West—I have heard that cold water was the best manure ever used for this fruit.

Mr. Pardee—Col. Stoddard, of Palmyra, N. Y., did succeed wonderfully by liberally watering his vines upon a thin soil of sandy land. His vines took the name of Stoddard's seedling Alpine; but when moved to other gardens, where they were not watered, did not succeed. In a bed, I would never have any kinds nearer than a foot apart, and the large kinds must have more room. All strawberry plants need much water, and all are benefited by tanbark water, or tanbark as a mulch. My most successful growth was upon made land over an old brook. The four best kinds, as far as my observation extends, is Wilson's seedling, Hooker's seedling, Hovey's seedling, and Longworth's prolific. Three of them are male plants, and are very productive.

Mr. Atwood stated that green sand marl was the best fertilizer for strawberries that he had ever tried, and Prof. Nash gave the same opinion.

Dr. Ward—The strawberry loses its flavor in proportion to the amount of rain. That was the case last Summer. Water increases the quantity, but not quality. As to manuring, I have long since ceased to use yard manure. I am satisfied that green sand marl is the best manure that can be used when it can be obtained easily. I am using marl and muck, combined with shell lime, and I use all the ashes I can get as a top dressing. If rich soil does favor the growth of vines to the exclusion of fruit, I should like to know it, for I have found that my biggest berries come from the very highest manured spots around my pear trees. From a strip five feet by seventy, my daughter picked one morning seventy-two quarts of fine strawberries. I never tried how much an acre produced. I am planting this year two acres.

Mr. Pardee—We may get the largest berries from highly manured land, but not the greatest quantity. I still answer, that I think Wilson's seedling stands at the head of all the varieties. They are early, but I think Burr's new pine the earliest. At Washington, the Alice Maud is the favorite early variety. The Hautboy is a high-flavored berry. I wish to remark, that I have no theory to maintain, nor interest in recommending any particular variety, or mode of culture. I only wish to see this fruit more generally cultivated.

The subject not being exhausted, was continued for the next meeting. Also, "The best and most economical method of renovating worn out soils."

The Club then adjourned.

JOHN W. CHAMBERS, *Secretary.*

MECHANICS' CLUB.

Organized March 2, 1854.

The first meeting of the season was held on Wednesday, May the 13th, 1857.

Present—Messrs. Tillman, Sands, Cohen, Godwin, Fields, of Wilmington, Delaware, Butler, Stetson, Haskell, Fisher, Leonard, Chambers, and others; twenty-three members.

The regular Chairman, Mr. Haswell, being absent, Mr. Haskell was chosen Chairman *pro tem.* Henry Meigs, Secretary.

Mr. Fields explained the anti-freezing hydrant erected in the Repository. He and Mr. S. Gerhard are the patentees. This apparatus prevents all waste of water, and is self-closing. The water all leaves the pipe, and retires to the ground, and by moving a crank, instantly rises to full head; thus preventing the process of chemical solution of the metallic pipes, which is much increased by the water in them being under heavy pressure while at rest. It is claimed for it, that it will work for several years without repairs.

Mr. Godwin remarked, that the principle is not new by any means, for he, being a plumber, was well acquainted with it. His friend, Haines, of this city, some time ago invented one.

Mr. Fields doubted whether Mr. Godwin understood it; and asked Mr. Godwin to draw Haines' hydrant on the blackboard, while he drew the other.

With the assistance of Mr. Tillman, it was drawn, and Mr. Godwin drew the other· so that comparison was perfect. Both having been explained

Mr. Tillman observed, that the principle was the same in both hydrants. He explained the self-opening and closing gate of Mr. Ayres'. This being approached from either side, the two gates open fully, and remain so until the carriage has passed, and then closes. This manifest advantage to heavy loads of farms and carriages with many persons, drew the approbation of the Club.

Mr. Leonard explained the Ayres cattle well. Where there is a large number, it is serious work to draw water for them; and, besides, the cattle are not thirsty at the same time. This well being dug on the lowest part of a field, will, generally, not be very deep. A suitable bucket is suspended in it, so loaded as to sink readily. A moveable platform, suited to receive one ox at a time, steps on this, and his weight (or that of a calf) draws up the bucket, which then pours water from a spout into the trough, as long as the ox stays to drink. He retires, the bucket sinks, is refilled, and the next ox repeats the operation. This invention was approved. Even where there are ponds, the water is apt to be dirty; while the pure water from the well is as gratifying to an ox, as it is to a man.

Mr. Tillman—Some suppose that, in England, a man must be the inventor of the article which he patents. Not so, he may patent anything, from the United States or elsewhere.

The Chairman—Six months are now reserved in England for an original inventor to come in for his patent.

Mr. Tillman—We have furnished much in inventions. When the true history of the steam engine shall be written, it will be astounding. Does everybody know that our great discoverer in machinery, Oliver Evans, was the inventor of the high-pressure engine?

Mr. Godwin spoke of valves; and, by drawings on the blackboard, illustrated the peculiar and valuable character of Hansen's valves.

Mr. Lamothe exhibited his new model of a metallic steamship, in which plates and bands render her greatly stronger than the rivet plan. Also, a sort of suspended cabin, vibrating with the roll of the ship, much as sailors' hammocks swing to the roll.

Mr. Lamothe has patented railroad cars, on the some principle which he now applies to vessels.

Subject, "Steamships," ordered continued.

The Club adjourned, at about one o'clock P. M.

HENRY MEIGS, *Secretary*.

May 27, 1857.

Present—Messrs. Haswell, Stetson, Coates, Godwin, Haskell, Fisher, John G. Bell, Leonard, Prof. Nash, of Vermont, Heckrotte, Hall, Butler, Birdseye, Knight, Bingham, Webster, and others—thirty-nine members.

The chairman, Mr. Haswell, being obliged to be absent, James K. Fisher was appointed chairman *pro tem.* H. Meigs, Secretary.

According to rule, the first hour of a session is for miscellaneous business.

Price's new patent arrangement of car couplings, so that when one diverges off the rail it is self-uncoupled, and also Heckrotte's analogous coupling and bumper, were examined by the members. And it appeared to be the opinion of members, that these contrivances to release the locomotive, (at least) were valuable. Mr. Sawyer explained the *bat wing wind mill*, patented and invented by Solomon W. Ruggles, of Fitchburgh, Mass., which was admired. It is a horizontal mill of ten bat wings, forming so many angles from centre to periphery, inclined about five degrees—their amount of opening to the wind perfectly regulated or entirely closed, if required, from inside the mill. It appears remarkably effective, safe, and of moderate cost.

Mr. Leonard gave it the fit name, bat wing, from the movement of the triangular wings.

Tower's patent elastic ball pump and fire engine, capable of pumping up water containing three quarts of Indian corn in every gallon, was exhibited and examined in that operation, and found perfectly successful—it could not choke.

Mr. S. W. Ruggles, exhibited and explained his new patent machine for extracting stumps, by lifting power, which also acts in pressing hay, cotton, &c., with a force of one hundred and sixty tons. This machine is in very compact form,

easily wheeled where wanted, and costs about three hundred dollars. After the chain is made fast, which is soon done, the machine draws out the stump with all its principal roots, in perhaps half an hour altogether, thus clearing the ground of the roots, which render plowing difficult and almost impossible. All settlers on new forest lands know by sore experience the great trouble of cropping in a well stumped field. A field with the stumps and roots all drawn out is worth many left with them to the slow rot of years. It was fully explained by Calvin C. Bingham, of Fitchburgh, the agent of Mr. Ruggles.

Mr. Butler had carefully examined this machine, and was pleased with its form and action.

Mr. Clowe admired the ornamental and useful—he was pleased with this compact mechanic force, to lift the sturdy stump, pack hay, cotton, &c., a rare combination in one engine.

June 10, 1857.

Mr. Butler in the chair. Henry Meigs, secretary.

Present—Messrs. Heckrotte, Tillman, Stetson, Prof. Hildreth, Clark, Chase, Clough, Dr. Phelps, Clinton Roosevelt, engineer Waterman, Haskell, and others. 26 members in all.

The Secretary read the following papers prepared by him from the latest importations, viz:

SUBMARINE TELEGRAPH.

INSTITUTION OF CIVIL ENGINEERS.
London, January, 1857.

Two kinds of cable were mentioned; a simple one, composed of one wire in each non-conducting envelope. A certain number of them laid together side by side so that in the casualty of one or more broken the rest act. And the compound one; a number of conducting wires in one envelope, covered with iron wire.

The recent breaks in the cables suggest the simple one, for, although some have been partially injured they have never ceased to convey messages.

The difficulty of working through the Atlantic cable was considered. An underground wire covered with gutta-percha, was laid by the Magnetic Company in 1851, from Liverpool to Manchester. Induction was maintained by it.

Sir Charles Bright, and Mr. Whitehouse, some time since, made experiments through 2000 miles of wire connected so as to form a continuous circuit terminating, at both ends, in the earth. Intermediate instruments were placed at each loop to test the thorough action of the electrical waves through the entire length, and signals were clearly defined at the rate of ten to twelve words per minute. Two large induction coils, three feet in length, excited by a powerful "grove" battery of fifty pint cells, but connected for quantity in sets of ten, were used to generate the currents, which were very powerful. From the results on this 2000 miles of wire, it appeared that no difficulty is likely to arise in working from Ireland to Newfoundland, that could not be effectually dealt with. Portions of the submarine cable leading to Calais and Ostend, ruptured by anchors, were examined. The iron wire was broken, yet the gutta-percha covering of the copper wire was but little injured, and in as good a state as when laid down, five and one-half years before. A trace of a drawing made by Professor Wheatstone, in 1840, showing a submarine cable insulated by tarred yarn and covered by iron wire, was exhibited. It was made by Lutwiche, who left for Australia in 1841. It was always said of Lutwiche that he had aided Prof. Wheatstone in the mechanical details of the submarine telegraph. Experiments on long submerged wires were made in 1854, by Latimer Clark. Lectured upon by Faraday, January 20, 1854.

Prof. Wheatstone had proved the passage of the electric current to reach the enormous speed of 288,000 miles per second. It is believed that twenty words may pass from England to Newfoundland in seven minutes, and 200 messages in a day. Other experiments show, through 1600 miles of wire, an average speed of 1000 miles per second. The velocity is not constant.

Mr. Thaddeus Sellec, of Greenwich, Conn., called the attention of the Club to the iron works at Danville and vicinity, in Morton county, Pennsylvania, within ten miles of the junction of the west branch of the Susquehanna.

Mr. Selleck calls attention to the vast extent of the work in iron there. From the adjacent mines there are taken, every

week, three thousand tons of ore, out of which there is made, every week, from twelve to fifteen hundred tons of pig iron, by using about three thousand tons of anthracite coal, from Luzerne county, drawn about forty-five miles by canal. Of this pig iron, about seven hundred tons of finished rails are made per week, using about fifteen hundred tons of coal per week. The quality of the rails is equal to any made in the United States or imported from Europe.

These great works arose from the discussions on iron, held in the American Institute at its conversational meetings, some twelve or fifteen years ago. The question then was, can we make railroad iron? The negative was very pertinaciously sustained by gentlemen in the foreign iron interest.

Mr. Selleck says that even this large production of iron is constantly on the increase at Danville.

STEAMSHIPS—PREVENTION OF LOSS BY FIRE.

By Henry Meigs, May 27, 1857.

The entire furnaces and machinery must be inclosed in a compartment made of the heaviest boiler iron, and its upper edges must rise some feet above the upper deck; over this a trellis work sufficient for men to walk over.

In common practice, wood-work is so near the furnaces that pine knots give out their turpentine and are ready for instant and overpowering flames.

It is not necessary that the great iron kitchen should be so fastened to the frame of the ship as to be wrenched or injured by the working of the timbers. And the whole hold of the ship should have cargo cells of like strength, especially all along the middle of the ship, so that if the side cells should be injured, the middle ones would not. Hatchways over each cell convenient to put in or take out cargo. Thus safety from fire and sinking are immensely more sure than under our modern extra hazardous steam ship structure. We think that if the mid section, from stem to stern was an iron tube so much the better.

THE FIRST RAILROAD.

[London Artisan, of April, 1857.]

In 1818, Mr. Pease proposed the formation of the Darlington railroad, from the river Tees to the Collieries west of it; for which, after a hard struggle, an act of Parliament was obtained in 1821. One of the difficulties was to procure sufficient subscription. It was $50,000 short, which Mr. Pease took upon himself. The act required half a million dollars on a road thirty-two miles long. This road has since been extended to 130 miles, and cost about twelve millions of dollars. The road was not open for use before September 27, 1825.

H. Meigs—In 1818, in the Assembly of the State of New-York, at Albany, in February, I proposed a railroad instead of the Erie canal, because it would be useful all the year, while the canal would be useless for months in winter. Because the speed on the road, all curves allowed, would readily be on an average of fifteen miles an hour, while the canal boat would have but three; and because railroads can be made where there is no water.

For these notions I was amply punished.

May 22, 1857.

I asserted that in some years the railroad would destroy the chief value of the canal then decided to be made.

The Albany *Argus*, of May 22, 1857, has the following in verification thereof, viz: "Within a few years the competition of railroads has so far impaired the revenues as to alarm the creditors of the State as to the security for their claims. The receipts of the canal which ran up steadily for a few years, have been falling as steadily since. The canal has been compelled latterly to reduce its charges of toll in order to sustain this competition. But even these reductions have been in vain. It is impossible for horse power, upon a canal, open only seven months in the year, to compete with the power of steam on the unfailing iron road."

In 1816, I published in the little *National Advocate*, edited by the late M. M. Noah, all these opinions under the signature "M." I was ridiculed for recommending people &c., to be rode on rails.

Extracts by Henry Meigs.

Royal Scottish Society of Arts, January 1857—*the President, Professor Wilson in the chair. A new method of producing an intense and steady light, by means of the Bunson lamp—by Alexander Bryson, F. R. P. S.*

This method obviates the objection of the frequent explosions while using the old Drummond light. It consists of a common Bunson lamp, without the air being admitted below. Through the middle of Bunson's burner is led a small tube, by which the oxygen is conveyed to the lime, which is placed above. There is now a union of the two gases until they both reach the lime which is rendered incandescent. It is much more steady than the usual light, and seems more intense.

The Association for the prevention of steam boiler explosions. Report at the last monthly meeting, March 1857, *London.*

During the last month, 257 firms have been visited, 673 boilers inspected, and 69 engines indicated. The principal defects which have been observed in these boilers, are as follows, (viz.) three boilers dangerous from over pressure; three boilers dangerous from corrosion or fracture of plates; three from injury, resulting from deficiency of water; eight boilers injured from the same cause, but not considered dangerous; three boilers not provided with sufficient safety valves; four others, pressure gauges very far from correct; two boiler gauges inoperative.

Railway accidents in England, Wales, Scotland and Ireland, during the half year ending December 31, 1856.

To passenger trains—twenty-three killed, 257 injured, passengers and companies men. Of passengers only seven killed.

Freight trains—six accidents ; collision, 24; running off rails, 10; breaking axles and couplings, 4; bursting boiler, 1; servants of the company, laborers, &c., 75 killed, 51 hurt.

These are all the accidents on all the railways of the United Kingdom.

Railway service of Great Britain.

At the end of June, 1856, 138,590 persons were employed on all the railroads of the United Kingdom. Total length of lines open in June, 8,506 miles. Total length of lines authorised at the end of June, 12,897 miles.

GALVANISM AS AN INDUSTRIAL AGENT.

France decreed a prize of 50,000 francs, in 1852, for the discovery of means of rendering the galvanic battery commercially available in the industrial arts, light, heat, as a chemical or medical agent, as a mechanical power. A committee is now formed for the purpose of examining and reporting upon the offers in competition.

Dumas, president of the committee; Messrs. Chevreul, Pelouze, Regnault, Despretz, Rayer, Serres, Charles Dupin, Sequier, Poncelet, Morin, of the Academy, and Reynaud, director of Lighthouse, and Henry St. Clair Deville, of the Normal School.

The Emperor of France has ordered a committee to examine and report upon a new electro-magnetic engine recently invented by Thomas Allen, of England. His engines are now at work in Paris, and it is said, will be applied to locomotion.

PAVING AND PAVEMENTS.

Mr. Hildreth—The specimen of rock on the table is a conglomerate of quartz pebbles, which appears to be too friable to become of economical value as a pavement. This rock, however, is very justly esteemed of value and importance in the construction of furnaces for the smelting of iron and other metals; as it has qualities of a refractory character, in which respect it resembles the fire brick, which is composed of quartz pebbles mixed with the clay of the coal measures, which is shaped in blocks about double the size of the ordinary brick, and then subjected to a constant high heat in kilns peculiarly adapted for the purpose, and then becomes like this rock, a refractory or fire brick.

The city of New-York has tried many experiments in paving, which have demonstrated many important facts. These experiments have shown the incomparable advantage of a very "tough" rock, obtained directly opposite the city, on the New Jersey shore of the Hudson river, which is known to geologists as Blue Trap rock. This is the rock which, upon Broadway, has been laid down in blocks from twelve to fourteen inches square on the surface, and is known as the Russ pavement, and subsequently the

same rock has been laid down in peculiar inverted pyramidal blocks, presenting from four to six inches only on the surface, and is known as the Belgian pavement. This kind of pavement has proved by use to be the best that has yet been tried in this city, as it avoids the principal objection against the larger blocks on Broadway, which wear smooth and cause many accidents to animals, especially in wet weather, during which the surface of the blocks is covered with a slippery black mud, which causes the animals to slip and fall, in which the want of crevices at shorter intervals in the blocks also contributes; such is not the case with the Belgian blocks, which enable the hoofs of horses to take frequent hold, and prevents their slipping and falling. The great value of the Trap Rock pavement, however, consists in its great resistance of the abrasion of the wheels of vehicles, and iron shoes of the horses; the rock is much more resistant than granite, and the people of the city may well congratulate themselves that it occurs, and in great abundance so near to their streets.

The streets of the city of Naples, which are paved with this rock, present conclusive evidence of its greatdurability, where for one thousand years the pavement has been in use, and has only worn during that long period to the depth of one inch. The streets of those ancient cities Herculaneum and Pompeii, were paved with Trap Rock, and although it must have been used for a long period prior to the destruction of those cities by the volcanic eruptions of Vesuvius, yet the pavement is now in a good condition, having been exposed to view by recent excavations.

The substitution of a friable quartz rock, which crumbles in the fingers, does not appear to be an improvement upon this very hard and almost incomparably resistant species of rock for paving purposes, the Trap, which, if worked in the proper shape, as in the case of the Belgian pavement, will answer nearly all the conditions required of it. Certainly nothing can be gained in an economical point of view, as the durability of the *trap rock* will prove itself superior to all other kinds of pavement, available to the principal cities of the United States.

I understand it is proposed to use the quartze conglomerate, in blocks of much larger size than the Russ blocks on Broadway;

and it may result from the experiment that the surface of this pebbly kind of rock, may wear rough, and in this respect avoid the objection of danger to animals; but I think it can never compare with the Jersey Trap, of the Belgian sized blocks, in point of durability and economy.

Mr. Clough exhibited and explained Estlake's patent invention for preventing damage to goods by water, in case of fire, patented June 8th, 1856. A model brick building, five stories high, with water pipes adjacent, throwing water into each story, as may be required, and as it accumulates on the floor, running off at a corner prepared to receive it, and pour into the street. So that although goods are wetted sufficiently to extinguish fire, they are not left soaking for hours. The floor to be laid with a slight inclination to the point of delivery, three inches to one hundred feet.

The subject of laying the submarine electric cable, being under consideration—

Mr. Hildreth, who was present at the last meeting of the Mechanics' Club, asked permission to make a few remarks, in relation to a paper read by the Secretary, from the association of civil engineers of London, concerning the electric submarine cable. He said that, in that paper, the success of telegraphing from Galway to Newfoundland was predicated upon an experiment made in England, of sending a current of electricity through two thousand miles of wire. The experiments of Michael Faraday had shown that, in water, the electric current had to encounter a resistance which was equal to three times the distance through the atmosphere; and that no calculation had been made for the inequalities of the bed of the ocean, which the rocky coasts of Ireland and America would indicate that it would be equal to nearly three times the actual linear distance from coast to coast, making a resistance to be overcome equal to the distance of twenty-seven thousand miles of wire through the atmosphere. Mr. Hildreth concluded that we ought not to be too sanguine of the success of the first experiment of laying the submarine cable.

Mr. Hildreth proceeded to narrate some interesting facts in regard to the origin of the electro-magnetic telegraph, which he ascribed to Dr. Charles T. Jackson, of Boston, whom he stated had described this invention, complete, with all its devices, to Samuel F. B. Morse, in the year 1831, on board the ship Sully, upon a voyage from France to New-York; and that Dr. Jackson had made, in his pocket memorandum book, drawings of all the essential devices of the telegraph, as since put in operation by Mr. Morse, to explain the same to Mr. Morse; and that he (Mr. Hildreth) had seen these drawings made upon the leaves of this memorandum book; upon alternate leaves of which were minutes of the dissection of a porpoise, made by Dr. Jackson, on board the Sully, at the time; and that Dr. Jackson had with him at the time the first electro-magnet which was ever brought to this country. Without an electro-magnet, and a knowledge of its principles of action, it would be preposterous to suppose that any one could have invented the electro-magnetic telegraph. Mr. Hildreth related a part of the conversation which took place on board the Sully, at the cabin table, between Dr. Jackson and Mr. Morse. Dr. Jackson had been describing the experiments which he had witnessed in Paris, of sending currents of electricity through wire arranged around the great hall of the Sorbonne. Mr. Morse enquired of Dr. Jackson, "Why we could not send intelligence through the electric wires?" Dr. Jackson replied, "We can." Mr. Morse then asked, "How?" Dr. Jackson then proceeded to unfold to him the details of the means and appliances by which it might be accomplished. Mr. Morse, after his arrival, attempted to avail himself of Dr. Jackson's method of telegraphing, but was not able to do so, and was compelled to write to Dr. Jackson, while the Doctor was engaged upon the State geological survey of Maine. Dr. Jackson answered his enquiries. These letters were placed in evidence in two suits in the United States Courts, in both of which Mr. Morse was defeated. These suits, one S. F. B. Morse *vs.* Hugh Downing and others, which was tried at Boston, and the other suit S. F. B. Morse *vs.* O'Reiley, was tried in Kentucky. Mr. Hildreth said, that the court house containing these records was burned in Kentucky at a suspicious time, and that a

case between the same parties, in Kentucky, was carried up to the Supreme Court of the United States, as he was of opinion, upon an agreed state of the facts and the arguments, by which Mr. Morse obtained a decision in his favor. And was also, of opinion that the telegraph companies had combined together to sustain Mr Morse's claims ; because, as it was plain to see, if Morse was broken down in his claims, the others could not sustain themselves, as they all used Dr. Jackson's device of the electro-magnet. The trials before the courts were upon the collateral issues of the conflicting devices between the machines of House and Baine and that of Morse; while the real issue of originality, as between Dr. Jackson and Mr. Morse, was not passed upon, as the main issue in either case, though used to the extent of defeating Mr. Morse on the two trials in question. Mr. Hildreth said, that the telegraph conceived by Dr. Jackson on board the Sully, had been put into operation by Dr. Jackson in his own laboratory, prior to the construction of any machine by Morse, and that its successful trial was witnessed by Mr. Francis Alger of South Boston. The Commissioner of Patents, M. Jones, refused during his term of office to issue a patent to Mr. Morse, but had offered to issue one to Dr. Jackson for his telegraph, but Dr. Jackson had refused, upon the ground that he thought that a scientific man ought not to hold a patent; Mr. Morse had tried to gain recognition of his claims in France. Dr. Jackson had previously filed his claims at the French Institute, together with the evidence upon which it was based, and that high scientific body had accorded the discovery to him. It now stood of record in the Comptes Rendus of the Academy, that "Mr. Morse is in Paris, and makes no reclamation." Mr. Arago, one of the *savans* of that body, who was familiar with the science of electro-magnetism, had conversed with Mr. Morse, and found him too ignorant of the subject to explain the principles of operation of the electro-magnetic telegraph, although the machine to which Mr. Morse's name is erroneously attached as the originator, was then in operation. Mr. Arago then remarked to his brother members of the Institute, "Mr. Moise could not have invented the telegraph." Dr. Robert Hare, who was an expert, on the trial at Boston, had remarked to Dr. Jackson, "Sir, you

ought not to be here as a witness, but as a principal." Those who know Dr. Hare would be able to appreciate the remark. Dr. Jackson had also been called by the defence in that suit.

Mr. Hildreth remarked, that we ought not only to be just, but generous, and award merit in discovery where it belonged. Mr. Fulton, to whom the popular mind ascribes the invention of the application of steam to the propulsion of a steamboat, had made a trip upon the river Clyde, in Scotland, in a steamboat, before his memorable trip up the North river; while the bones of Mr. John Fitch, the real inventor and discoverer, who had exhibited his model of a steamboat to Mr. Fulton in France, some twenty years previous, now lay in an unhonored grave, on the banks of the Ohio. It was not until sixty years after the death of Watt, that the French Institute sent a commission, consisting of Messieurs. Arago and Dumas, to England, to collect facts, to enable them to write an eulogy of Watt. Mr. Hildreth said he had seen twenty-six books, in the languages of Europe, speaking of Dr. Jackson in the highest terms, in regard to another discovery made by him, of rendering the human body insensible to pain during surgical operations and child-birth. In one of these books America was spoken of as "the country of Jackson and of Franklin." The highest Montyon prize for the greatest discovery in medicine and surgery, for the year 1850, was awarded by the French Institute to Dr. Jackson, for his discovery of etherization; and the honorable members of that body had procured of the government of France the Cross of the Legion of Honor, at the same time that they procured a similar distinction for the eminent naturalist, M. Ronpland, who spent nearly a lifetime in profound researches in South America. The present Sultan of Turkey, seeing the vast importance and advantage of this discovery, during the Crimean war, where it had been successfully used in thirty-one thousand cases, had conferred upon Dr. Jackson the decoration of Mejidiah. The King of Sweden, at the suggestion of the great chemist Berzelius, had also awarded to Dr. Jackson a gold medal of merit, struck expressly for the occasion. These two discoveries were not all that had been made by Dr. Jackson. Mr. Hildreth knew of many others made by him, and instanced his dis-

coveries of mines of native copper, at Lake Superior, the occurrence of which, except as an accidental product, was denied by all the geologists of the United States. Dr. Jackson nevertheless maintained that they did exist, as he had predicted from his surface experiments; and his friends have since proved and verified the deduction of Dr. Jackson, by opening these mines. Mr. Hildreth spoke of Dr. Jackson's high character for truthfulness, and said, he would rather lose his life than misstate a fact. He also spoke of his having dissected the first cholera subject in the city of Vienna, when the cholera made its first appearance in Europe, while all the great surgeons of that city looked on through a glass window, momentarily expecting the death of the Doctor, who was then quite a young man. Dr. Jackson had risked his life in a similar manner, for the benefit of humanity, in making his discovery of etherization. Mr. Hildreth, in reply to a suggestion of Mr. Tilden, that Mr. Wells had been awarded the discovery of etherization, said, that such was not the fact. The discovery of etherization was made by Dr. Jackson, in a lecture delivered by him before the Mechanics' Apprentices' Library Association, during the winter of 1841, in which he was engaged in showing the theory of volcanic eruptions. He had accidentally broken a glass jar filled with chlorine gas, by which his lungs were filled with it, and became greatly irritated. He then sent for sulphuric ether and ammonia, and breathed each, alternately, as he had been accustomed to do in these accidents since 1831. Discovering a cessation of pain in his lungs after breathing the ether, it occurred to him that he had paralyzed the nerves of sensation; and determined to test this, he went to his laboratory, and, notwithstanding ether was described in all the works on materia and toxocology as dangerous to breathe, and accounts of death by it were given, he then breathed it to the extent of entire insensibility; finding that, upon awakening from it, he perceived no sense of touch of the chair in which he was seated, the idea flashed upon his mind that he had made that great discovery for which he had long been seeking—a means to annul pain in the human body. Mr. Wells, in presenting a written statement of his claims to the French Institute, (among fourteen other claimants beside Dr. Jackson,)

claimed that "up to the year eighteen hundred and forty-five (1845) he preferred to use prot-oxide of nitrogen," or laughing gas. Mr Wells had thus, by his own statement of his case, precluded the idea that he could have made the discovery of etherization. Prot-oxide of nitrogen had not and would not produce anæsthesia.

Mr. Hildreth, in his concluding remarks, said, he was willing to concede credit to Mr. Morse for great commercial enterprise, in bringing out the electro-magnetic telegraph; but not its discovery, or that of any of its parts.

Mr. Roosevelt considered that there would be no resistance to the electric wave, (insulated in gutta percha as it is) by pressure of the superincumbent ocean. That he considered the transmission through the wires as if in a solid timber of any imaginable length, if one end of it be moved at all the other end must instantaneously move as much in the same direction.

Mr. S. D. Tillman observed, that after much attention to this subject, he greatly feared the approaching experiment would fail. The difficulties attending the paying out of a line of such immense length; the danger of abrasion on the frequent out-croppings of rock from the bed of the ocean, particularly those on the coast of Ireland; the obstacles to the perfect working of batteries at such a great distance from each other without "relays" through a delicate medium liable to derangement, and which by a single defect, would be rendered useless, all furnish considerations which forced him to the conclusion that the proposed connexion of the continents would not be permanent. We must not, however, infer from this failure that the desired end is unattainable.

In this as well as in many other great national undertakings, the path of success lies in an opposite direction. The *grand thought-way* of the world is destined to span our own continent and unite the *West* with the *East* at Behring's Straits. A line of electric telegraph to the Pacific, is of great importance in itself, for by it we are to hold hourly communication with Utah, California and Oregon, and in effect to bring China herself twenty days nearer to us. While responsible parties in our own country, now stand ready to build at their own cost, this line to the Pacific, he could not doubt the entire feasibility of running it northward to the Russian possessions, with the aid of our Government. To

extend it from thence to St. Petersburgh, is a feat worthy of a Czar. Let him but give the order for its construction to the same enterprising American mechanics who have planned and built his great lines of railway, and we may be sure of its completion. Nearly the whole of this proposed line will be above water, always accessible, and easily repaired. In its operation "relay batteries" could be used, and thus the old adage would be verified on the grandest scale, "the longest way around is the surest way home."

The progress of commerce and civilization will soon demand not only this (instanter) line to Europe, but a southern branch to Asia, extending perhaps to the very heart of the Celestial Empire. Let us then expedite the construction of the Cis-Pacific telegraph, and trust to the ever rising energy of Russia for its completion in the old world.

Prof. Hildreth said there were, no doubt great irregularities in the bottom of the ocean route for the telegraph.

A conversation between Messrs. Tillman, Hildreth and Roosevelt, relative to the rival claims of Morse and Jackson to telegraph discovery ensued. Mr. Tillman believed Morse's claim to be established beyond a doubt, by the long and close investigation it has undergone in courts of justice and out of them.

Mr. Roosevelt proposed that the Club at some meeting, discuss the claims of Jackson, and also of Fitch as to steamboats.

Mr. Clark, of Manchester, in New Hampshire, exhibited his patent window shades, fire proof, and explained them. The laths are of thin cast iron. Patented last April.

Mr. Chase, exhibited a model window blind, whose laths incline from the middle of a window to its sides at an angle of about thirty degrees, presenting when closed, the angle in the middle. Mr. Chase claims that view of the streets, &c., is easy through the laths! and they do not keep the dust as parallel blinds do. He also suggested that laths may be arranged in fancy forms to please some tastes.

Subject for next meeting, "Steamships."

At 10½ o'clock P. M., the Club adjourned.

H. MEIGS, *Secretary.*

June 24, 1857.

Present—Messrs. Tillman, Haskell, Leonard, Stetson, Fisher, Waterman, Clough, Butler, Knight, and others—twenty-six members in all.

The regular chairman being absent, S. D. Tillman was elected *pro tempore.* Henry Meigs, Secretary.

The Secretary read the following articles taken from the works received by the Institute, since the last meeting, viz:

A valuable notice of the liability of gutta percha to decay.

[Journal of the Society of Arts, London, March 13, 1857.]

DECAY OF GUTTA PERCHA.

The following observations on the state of the underground wires of the British Electric Telegraph company, are given from two reports of Mr. Edward Highton, to the directors of that company.

Having understood that the wires south of Berkhamstead had failed, in many parts, I went there yesterday with a view of endeavoring to ascertain the cause of such failure. I selected for examination a district commencing about a mile to the south of Berkhampstead. I selected a length where the wires passed near the roots of oak trees, and then near the roots of ash, and Italian poplars, with only one oak tree among them. I found the wires and wooden boxing had failed, and had been renewed for several yards, in passing every single oak tree, including the isolated one above mentioned, and nowhere else!

I had the earth removed from the wires at various places, and selected in particular, those spots where the newly replaced wires and boxes joined the old wires and boxes. I found boxes laid down in March last, in a state of decomposition, while old boxing, put down two or three years ago, and within seven yards of the same, was perfect. I have found the wires perfectly good, and completely rotten within seven yards of each other.

This proved the action to be local. My attention was then directed to the probable cause of the decay. On opening the first part where the wires were decayed, I observed a remarkable peculiarity in the soil; I detected at once a whitish looking plant, resembling the spawn of the mushroom, or of some other fungus,

pervading the soil and filling every crevice. I found that it had utterly destroyed all the dead roots of the oak and plants on the edge. Its branches spread all over and around the wooden trough, covering it with a whiteness resembling a white-wash. I found wherever the plant touched the gutta-percha wires the gutta-percha was rotten. I find that the wooden troughs laid down in March last, (1856) in the vicinity of this plant, are more rotten than troughs within seven yards of the same, (where there is no trace of the plant,) which have been down since the commencement. I anticipate that the whole of the wires which have been lately laid down in those particular parts, will again decay in a short period of time. The breakage that must have taken place, and which is taking place, in spots over a length not exceeding one-third of a mile, is quite enough to stop all telegraphing between Manchester and London.

On my first noticing this peculiar subterraneous plant, I immediately searched for funguses under those oak trees. I found a yellowish green fungus luxuriantly growing under every oak, without exception, but not one under an ash or other tree.

Whether this vegetable production, the white, is the spawn of that fungus or not, I cannot say. The facts observed to-day would almost warrant that conclusion. It has a powerful odor. On breaking up the soil a few inches it is at once detected. The absence of this plant and a most perfect state of wires are coincident also. All the wires were two feet deep in the ground.

I have examined the spawn with a microscope of the power of 500,000 times. It presents all the characteristics of the mycelium of the fungus. Wire near oak trees with no fungus were unhurt. I have examined the wires which were laid in iron pipe and they were in a state of decay within one inch of the ends, while that in the adjoining wooden boxing was as perfect as when first laid down. In one wire at Winslow, I found the gutta-percha so decayed and cracked that the copper wire inside was visible. The decay in the iron pipes is from causes totally different from that by fungus.

STEAMSHIPS.

By Henry Meigs.

The last ten years of thinking on steam navigation has resulted in a sort of compromise between the side wheels and the screw.

It is manifestly error not to avail ourselves of the cheap power of wind, on the ocean. And when wind is either wanting or adverse, we still wish to go ahead. Thus comes in the screw as an assistant, and the wind blanks are filled in by the screw powers. Certainly we ought not, if possible, to cease to avail ourselves of the winds, especially on the Atlantic, whose windy character is permanently established.

We believe that the screw propeller will (if it is not already,) be so arranged as to be triced up snug under the stern of the ship, so as not in the least degree to impede her sailing.

By thus equalizing the hourly speed of the ship, we make two voyages, nearly, for one; or in point of economy, we have two ships in place of one. And the mere economy of time is to us short lived beings, of incalculable value.

We believe in making ships that cannot sink; not being able to understand, in our philosophy, why a ship should be so constructed as to sink, by any possible chance. Or, in plain terms, a ship whose specific gravity cannot exceed five hundred, that leaves her one-half in water, and no more. We believe that the inveterate stupidity of men has made ships of one skin, so that a hole in any part of it ensures the filling of the whole vessel with water. A man built on that plan would be a blood bag. Make a hole in the bag anywhere and the blood all runs out. We believe that the time is near when we may be as safe at sea as on land; when fire and wood-work will no longer be together, as they are now universally, but fire and iron only. We also believe that fire and steam will eventually be displaced, in locomotion, by other powers as effectual and not hazardous. Chemistry owes us that from the days of Dr. Black, of London, to this day. He tried to play a trick on gunpowder by using it in place of steam, by burning small portions at a time under pistons. So making it a working servant and not a murderer! Electricity has long been attempted, but as yet, like a wild horse of the pampas, he has yet to be lassoed!

Speed, so earnestly invoked by all mankind, is a grand point in all motion, but that reckless unscientific method we so generally follow, has marked its tracks here with much of the most precious blood of our citizens! We especially deplore the bloody agony of the women and tender children killed by this Juggernaut.

Habit has astonishing power to blind human judgment; yet, although the results of war are not greater in horror, yet we hail the conquering heroes; lift our brilliant banners to the breeze; enter our cathedrals, and the national voice in "*Te deum laudamus*" resounds! Over the victims of speed, the less said the better, we are all hush!

Dr. Knight exhibited and explained his patent life preserver, the principle of which is a small mask defending the mouth from water and resting upon the buoyant jacket secured to the throat so as to keep the head erect notwithstanding the tiresomeness of that erect position, after some time, so that without it, persons are known to become so tired with keeping the head up, as at last to be drowned by the drooping thereof.

Mr. Clough exhibited an apple slicer in full operation, which divides an apple or a potato in twenty segments of equal size at the rate of twenty slices every six seconds of time. Useful for drying for pies &c. Cost about one dollar fifty cents each machine. Invented by E. L. Pratt, of Philadelphia, Nov. 11, 1856. The operation of this useful little machine very much pleased the Club. Mr. Clough called it the automaton slicer, but like all automata, a real human muscle lies at the bottom, in androides, automata rappers as well as slicers, chess players &c., like men.

Mr. J. K. Fisher exhibited excellent drawings of his steam carriage, and he illustrated his furnace and boiler upon the black-board. Adverted to some older efforts in this direction and to several inventors now at work for the prize of steam carriages. One pursues an old idea, that of giving it legs; another borrows from Boydell his bits of track to be regularly placed before his wheels, like so many snow-shoes. He adverted to the difficulty of persuading inventors to let the public into the

secrets of the faculty, for the notorious pillage of valuable scientific property has completely closed their lips before their patent has got the national seal upon it.

Mr. Leonard invites communications from men of science for our annual Transactions. All such papers will be welcomed, and on approval by our committee on Arts and Sciences, they will be published therein.

Mr. Tillman made some remarks as to the efforts of some men to endeavor, in making our propellers, to imitate nature, while there is no model in nature that will serve our scientific mechanism.

Mr. Meigs—If any, perhaps the volvox, among the minute creatures of water, acting like a wheel in revolution.

Mr. Tillman—The late chief of the Patent Office, Mr. Ewbank, will, if requested, I have no doubt, give the Club his views on this propeller question, upon which he has bestowed much time and consideration; and which, as Mr. Stetson has just well said, let us learn; and which I say, when discovered, will make a great fortune for the discoverer.

Mr. Fisher moved for a committee of three to inquire and report upon the practicability of organizing a "Steam Transit Improvement Fund." Carried, and the chairman appointed as that committee, Messrs. Fisher, Stetson and Butler.

The committee on the selection of questions reported a continuation of "Steamships."

At half-past 10 o'clock, P. M., the Club adjourned to the second Wednesday in December. H. MEIGS, *Secretary.*

December 9, 1857.

Thomas B. Stillman, in the chair. Henry Meigs, Secretary.

The Secretary read the following translation, made by him, viz:

It is strange that men have wrought iron from the ore and have made steel of it ever since the fabulous ages of the world, and yet are still continually busy in trying to do it better. A list of the experimenters and their experiments in iron and steel since the days of fabled Vulcan, would form an enormous library! Yet still the experimental work is going on with increasing zeal.

Mons. L'Abbe Pauvert, of Chatellerault, France, has taken ou in England, three patents for this purpose.

1st. In making iron. To drive off from puddled iron the sulphur, phosphorus, and other metalloids (in substance, to drive every other metal out of the iron) by cementation. His cement is composed of fourteen parts (by weight) of oxide of iron, thirty of highly aluminous (the purest) clay, fifty of carbonate of lime or of wood ashes, four of fine pulverized charcoal, one of carbonate of soda. These are not all of them indispensable. I place the iron and cement in layers in the cementing furnace, and heat it in the usual way. We then weld it—draw it into bars—it is as soft and tenacious as charcoal iron.

The many electric currents produced by the mutual reaction of the elements, the reduction of a part of the earthy and alkaline metals and of a portion of the oxide of aluminum, favor the escape and the absorption of phosphorus, sulphur and other metalloids. In order that all the carbon may be decomposed and disappear in the state of oxide or carbonic acid, it is necessary that the carbonates and oxides should be in excess, &c.

The following communication from Mr. Edward Wasnedge, was read by the Secretary—

Secretary of the Mechanics' Club:

Sir—I desire through you to present to the club, and through the club, or the American Institute, to all who may find it convenient, (and without restriction or patent right,) a contrivance that I have arranged for cutting teeth in my " tooth chissels" for dressing stone.

The tool is essentially a die, fixed below with a cutting punch, moving vertically between guides, so as to bring the punch invariably in the notch so as to cut out the space between the teeth. At the same time, on a level with the die is placed a projection that catches the space last formed, thus making the teeth of the same size. The punch is drawn down upon the side of the chisel by a lever with a treadle, then forced through by the blow of a hammer, and is drawn up on raising the foot, by means of a spring, ready for the next tooth.

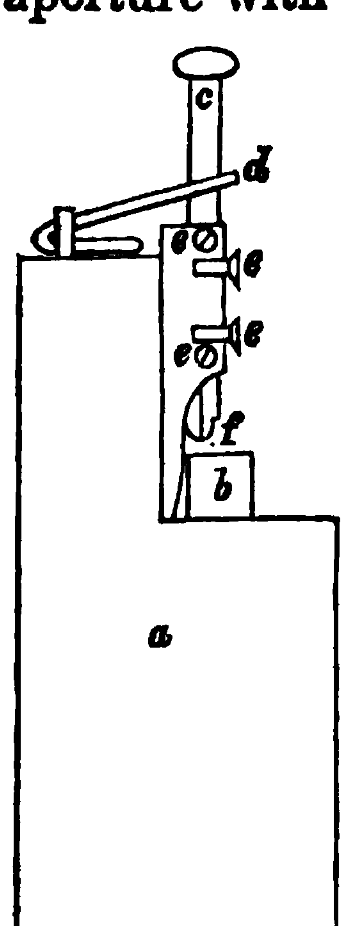
To show how easily and cheaply this tool can be made to answer a temporary purpose, (as in the present case,) I will describe the actual arrangement.

A log of wood is sawed half way through at about eight inches from one end, and the piece of eight inches long cut out to form a square corner. The die, or stationary part of the cutter, is made from an old hammer, having on one side a notch, the shape of the space between the teeth, this notch being placed toward the upright side of the block of wood, and then secured by a point below driven into the block. Against the upright side of the block is screwed a smaller piece of wood, having a groove, in which fits the punch that is made from a large flat file. The sides and back of this groove have slips of hoop iron, that are set either way, by means of wood screws, and the front in same manner by means of wood screws, has two pieces of hoop iron crossing horizontally. By means of these set screws the punch can be moved in any direction. The spring that raises the punch requires to be strong, as there must be considerable friction when in such rough work, the punch is to be kept true. This spring is made from a second large file. The remaining portions require no description.

As to results. I find no difficulty in finishing all the teeth at one beat (generally about eight,) without any assistance.

With the screw press, and the lever press, ordinarily used for this purpose, two men are required.

It is evident that the same arrangement would answer for any other purpose where the punch requires to be driven through an aperture with accuracy.



The annexed diagram will give a better idea of the arrangement; the lever to press upon the spring (*d*) being omitted, so as not to complicate the figure: (*a*) is the block of wood; (*b*) is the anvil or die made from an old hammer; (*c*) is the punch made from a flat file; (*d*) is the spring made from a second flat file; (*e*, *e*, *e*, *e*) are set screws, or common screws driven into the wood; (*f*) is the cutting part of the punch, having a shoulder to stop its descent when it reaches the chisel, and prevent the sharp end of the punch striking the bottom of the opening in the die.

Yours, respect'y, EDW'D WASNEDGE.

Passaic, Passaic Co., N. J., July 14, 1857.

Dr. Neill's safety stirrup was examined by the Club.

Dr. Neill gave the following description of the invention: This safety stirrup for riding saddles, may be made of any desirable pattern. The cross piece which holds the stirrup strap, works in a large joint at one end, and at the other, is held by a movable pin. A lever projecting slightly in front, encircles the upper part of the stirrup, and is so arranged, that it is impossible for a person to be dragged, without some part of the foot pressing against this lever, which draws out the pin above alluded to, and instantly the stirrup drops from the strap and releases the fallen rider. While the person is on the horse, no movement of the foot can detach it; but if he is thrown, and the foot remains fastened, then the stirrup cannot stay on an instant. The whole affair is exceedingly simple, and appears to be all that can be desired. It should be seen to be appreciated.

Messrs. Tillman and Fisher, from the question committee, offered the following subject for next meeting, viz: "Iron castings."

Messrs. Fisher and Butler, from the committee appointed at the last meeting, on the practicability of organizing a "Steam Transit Improvement Fund," made a report, which was on motion of Mr. Tillman, laid on the table.

The Chairman was requested to remark upon the subject of steamships.

He occupied nearly half an hour with a statement of his experience in steam machinery, and in reference to all the inherent difficulties in iron and the working thereof; he gave out more knowledge of iron than can be found in all the books; other men full of practical knowledge, may have known as much, but have left it all unspoken and unwritten. It was the unfolding of a mystery, ignorance of which is destructive of human life and property, to the most alarming degree.

Mr. Fisher remarked on the propriety and profit of high pressure steam in boats.

Mr. Cohen gave valuable suggestions on the proper construction of the furnaces—on economy of fuel.

Chairman—I have observed most perfect combustion where thin strata of coal are used! The Mississippi steamboats lose smoke enough to drive as many more boats!

Mr. Tillman spoke of oscillating cylinders, their origin and their economy of space in sea going vessels.

Chairman—They were invented more than twenty-five years ago. Their use is now revived; they give advantage by their less weight and space; they are as costly as others; the cylinders are heavier and more difficult of construction.

Mr. Fisher hoped that the Chairman would prepare a paper for us on the subject of steam engines.

The Club adjourned. H. MEIGS, *Secretary.*

December 23*d*, 1857.

Present—Messrs. Thomas B. Stillman, Jordan L. Mott, Sibley, Cohen, Steele, of Jersey City, Fisher, Tillman, Dwyr, of Brooklyn, Whitney, Geissenhaimer, Butler, Ebbitts and others; twenty-two members.

Mr. Stillman in the chair. Henry Meigs, Secretary.

[London Athenæum, October, 1857.]

RAILROADS OF GREAT BRITAIN.

Extracts by H. Meigs.

Parliament has authorised the raising of nearly £400,000,000 sterling for these roads; and nearly £300,000,000 of it has been actually applied. A stupendous sum, more than one-third of the national debt, and more than four times the value of all the real property in Great Britain. The earth-works are 550,000,000 of cubic yards. The locomotive engines are 5,000, and would cover in length over 30 miles. The cars, of all sorts, over 150,000, would cover in length 500 miles. The rolling stock is worth £25,000,000 sterling. About 100,000 men are attached. Four tons of coal and twenty tons of water are flashed into steam every minute throughout the year. To lay the roads, 26,000,000 of sleepers were required, of which 2,000,000 must be renewed every year. New rails to 20,000 tons a year are required. The sleepers

require 300,000 trees a year. 5,000 acres of forest are cleared of timber for that use every year. 120,000,000 of passengers are carried annually, reckoning 14 to a ton. The fare is £20,000,000 sterling a year.

What a contrast between old slow travelling and this. The first old excursionist, Asclepiades, who travelled abroad seated on the back of a cow, and lived on her milk by the way.

[London Farmer's Magazine, December, 1857.]

STEAM PLOW.

Fowler's Steam Plow.

To Mr. Fowler belongs the honor of applying effectually the aid of steam as a draught power in agriculture. I first noticed it in 1854, at the meeting of the Royal English Agricultural Society of Lincoln, where Mr. Fowler had one of Clayton and Shuttleworth's six horse power engines, stationed upon the hill side, near the top of the field. With this light engine he was executing drainage work in the lower end of the field, requiring the united strength of one hundred and eighty horses, the clay being so tenacious, and the depth (four and a half feet) so great, as to cause the plow to move not faster than eight yards per minute.

Boydell's is the universally known steam horse, which walks on his numerous feet or shoes.

Collinson Hall's traction engine is similar, but has the endless railway very compact, and of much less weight, not exceeding seven tons, water and all. It employs three hundred to three hundred and twenty pounds pressure per inch. It will require weight in the engine to draw well. Mr. Smith has another stationary engine, by grubbing. Mr. Fisken another, working by a travelling windllass.

Romain's Canadian steam plow was tried in England, on the 11th of September, 1857, with marked success. It is now the property of Mr. Crosskill, who is so well known in Europe by his invention of the machine clod breaker. The first working model of his plow was made for the Paris exhibition of 1855. The Canadian committee voted him £800, equal to $3,200, to

aid him. It pulverizes the soil, and leaves it in the best condition, by deep and double digging, and is followed by a harrow and clod breaker. It displaces and breaks to pieces such bricks as are in the way, cuts up roots, passes over large stones, but throws small ones up. It plows at will, from three to twelve inches deep, at the speed of one mile per hour, or nearly one acre, at a cost of four to five shillings an acre. Mr. Romain is a native of Quebec, but long established at Toronto.

The Chairman spoke of the experience he had in iron castings, from the smallest pipes to the largest cylinders. He uses many different grades of iron for different purposes. In cylinders he uses iron of a close, fine texture, because it is not liable to be cut by the action of the piston, nor to corrosion. When a cylinder is made of soft iron, the steam often honeycombs it. And it is also the case with railroad car wheels. We have sought for the best iron for these purposes; iron of a close texture, refined by melting and mixing together several different sorts of iron, we have obtained a cast shaft almost as strong as the best made of wrought iron. The qualities of iron are very various. Some kinds make good steel, others will not.

The Chairman was thanked, and requested to prepare a paper for our Transactions.

Mr. Tillman suggested the probable advantages of the use, in appropriate parts of important machinery, of other metals. He remarked, that cobalt was twice as strong as iron.

Mr. John D. Ward, of Jersey City, read the following paper upon the mode of casting and proper selection of materials for water pipes, for towns and cities:

Water pipes made in dry sand or loam, may, in consequence of the strength and solidity of the molds, be cast either vertically or at such an inclination as will insure the soundness of the metal, in all parts of their length.

When cast in green sand, the molds require to be left so soft as to allow the gases generated by the action of melted iron upon damp sand, to escape through it in all directions; this, and the

little tenacity possessed by sand, when in proper condition to receive the melted metal with safety, renders these molds too weak to sustain the pressure to which the lower portions would be subjected, if, when the castings were made, they should be placed vertically, or indeed in any other position than nearly or quite horizontal.

When cast in "dry sand," in suitable boxes, they may be molded from iron patterns, cast and turned to the proper size and form; the material composing the molds, which is a mixture of coarse sand and clay, may be much harder rammed than green sand will admit, with safety, and the patterns may be turned about in the moulds before thay are parted, thus insuring perfection in the external form, and accuracy in the size and position of the prints, which receive and retain the cores upon which the interior of the pipes are formed.

After the patterns are drawn, the moulds are finished, and receive a coat of "black wash," composed of powdered charcoal and water, in which there is generally mixed a small proportion of fine clay, or sometimes molasses, to render it adhesive. This is laid on with a soft painter's brush, or a swab made of raw flax or fine soft hemp. The molds are then made perfectly dry, care being taken not to raise the heat so high during the operation as to burn the charcoal blacking.

The cores are made of loam, laid upon a straw rope, wound about a strong hollow core bar, fitted with an axis, upon which it is made to turn, in order to give the plastic loam its proper form. These, when truly formed, are also finished with a coating of black wash, and are dried in the same manner as the molds.

The core bars used for pipes cast in dry molds should have the bearings at the faucet ends turned, to precisely fit the print made by the pipe pattern, and this furnishes to the workmen an unvarying guide for the size of that end of the core; thereby insuring uniformity in the diameter of the faucets, and more regularity in weight than is generally found in pipes cast in green sand, and especially those made upon green sand cores, as is sometimes done. If all the operations in this mode of casting, are properly conducted, the thickness of those cast vertically, or

at a high elevation, will be found the same, or very nearly the same, at opposite sides in every part of their length.

Loam moulds are made in boxes or shells, differing in form from those required for sand moulds, and are formed by a sweep attached to a revolving axis; the sweep having a profile identical with the exterior line shown by a longitudinal section of the pipe.

The moulds, after being "swept up," are finished, black washed, dried and treated in all respects, in the same, cr nearly the same, manner as dry sand moulds. The pipes, whether cast in dry sand or loam, should in all cases be allowed to remain in the moulds, unopened and undisturbed, until nearly or quite cold, in order that they may retain the correct form they receive from the moulds, and be preserved from the strains produced by the irregular contraction, which results from uncovering and exposing the heated metal directly to the cooling action of the atmosphere. Pipes cast in moulds, and upon cores thus prepared, and allowed to cool before they are removed, are found perfect in form, and have a surface, or as the workmen term it, a "skin," entirely free from sand, internally and externally, and which resists oxidation much longer than the surfaces of castings made in green sand. Their superiority to those cast in green sand, may be summed up as follows:

1st. Loam and dry sand pipes, cast vertically or at a high angle, have the metal equally solid on all sides, and are consequently free from the imperfections generally found on the upper sides of those cast horizontally, as green sand pipes must be, in consequence of the weakness of the molds; they are therefore stronger than green sand pipes of equal weight; the upper and lower sides of which almost invariably differ in thickness; and the thinest part determines its strength and durability, and consequently its value.

2d. Being more regular in thickness, they are more uniform in weight, and the required strength and durability are obtained, with the minimum expenditure of material.

3d. Being smoother and having surfaces less susceptible of injury by the action of air or water, than those cast in green sand, pipes of equal weight, will for these reasons be more durable.

4th. The flow through them will also be the maximum, in consequence of their smooth internal surface and uniform diameter, and they will be less liable to be obstructed by collections of sediment, or other matters which may find their way into them with the water.

5th. In consequence of greater perfection of form, the space for lead in the joints may be reduced to the minimum thickness, and by that means considerable saving effected in the cost of laying them.

The quality of the metal used in the manufacture of pipes for conveying water, is perhaps a matter of even more importance than the mode of casting them; for if an improper kind of iron is selected, no amount of skill on the part of the founder will produce strong and durable castings.

In order to produce sound, strong and durable pipes, it is requisite that the iron from which they are made should be as free as possible from the unreduced oxide, lime, silex and other impurities, which are always present, in greater or less quantities, in crude iron, as it flows from the blast furnace; and also from the excess of carbon which very rich pig iron contains. Of the latter, according to a late writer on the manufacture of iron, (Truran,) as much as eight per cent, by weight, is sometimes found, or nearly thirty per cent, of the bulk; and if to this be added the two or three per cent, by weight, of unreduced oxides and earths, it will appear, that about one-third of the bulk of such kinds of iron is composed of matters which injure its quality, rendering it weak, porous and liable to rapid destruction by oxidation. When water pipes are cast from iron of this quality, (as is often done at blast furnaces,) and subjected to proof by hydraulic pressure, they are generally found so porous, that if they do not burst in the proof, the water finds its way through the whole thickness of the metal.*

* The writer once saw four twelve inch pipes proved at the corporation yard, in New-York, which had been sent there by a blast furnace proprietor, in New-Jersey. They were selected specimens of a lot which he had manufactured and desired to sell to the corporation. They were proved at the ordinary pressure of 300 pounds per square inch, and three out of the four failed in the proof. In this case, an examination of the broken pipes showed that their failure was caused, partly, by the poor quality of the iron, which contained an excess of carbon and unreduced oxide, and earths, and partly from the fact that they were cast horizontally, in green sand moulds.

This leaking, if not excessive, is frequently cured by the formation of a sufficient coating of oxide upon the sides of the crystals, composing the spongy mass, to fill the interstices and prevent the further passage of the water. But at the same time that this process cures the leaking, it increases the original weakness, and shows that the work of destruction is going on, and that the destructive agent occupies the whole thickness of the metal, instead of being confined in its action to the outer surface alone. And this internal oxidation proceeds, in some cases, to such an extent, that parts of pipes may be broken almost like pieces of pottery ware, and granulated by being pounded in a mortar. Iron of this quality is therefore unsuitable for water pipes, especially where the head is sufficient to subject them to any considerable pressure, as it possesses neither the requisite strength nor durability.

If on the other hand, they are cast from No. 3, or white iron, they will also lack strength. Iron of this quality, in the first place, being weak; and in the next, castings made from it are liable to contract very irregularly in cooling, by which some parts are frequently brought into such a state of tension, as to cause the fracture and consequent destruction of castings before they leave the foundry, sometimes even while in the moulds and at a red heat.

These reasons, added to the difficulty of cutting and drilling pipes made from it, render iron of this quality unfit for the pipe founder's use.

In order to obviate the difficulties which attend the manufacture of pipes from either very soft or very hard iron, the practice of mixing the two kinds in the furnace is often resorted to, with the intention of producing such as is supposed to possess the proper character. The practice is however objectionable, as the mixture is never chemically perfect.

It is a fact well known to chemists, scientific iron masters, and steel manufactures, that the chemical union of carbon and iron can only be effected by cementation at a moderate red heat, and that they cease to combine when the temperature of the iron reaches the melting point. This being the case, if hard iron and

soft iron in right proportions, in the form of filings or turnings, were mixed and subjected for a sufficient length of time to the proper degree of heat, a portion of the carbon of the softer iron would leave it, and combine with the harder, so that, when melted, the whole would be of uniform quality, and constitute a No. 2 iron.

But this result cannot be attained, when pieces of several pounds weight, of each quality, are thrown together into a furnace, and melted down in the course of twenty or thirty minutes. In that case, the two kinds are mechanically mixed, it is true, and the mixture may be so intimate, that neither the workman's tool nor the chemist's most powerful microscope can detect the least inequality in its composition: but if exposed to air and moisture until the surface is slightly oxidized, it will be seen that the oxide, instead of being distributed over the surface in a uniform coating, as upon castings made from pig iron of uniform quality, will appear in numerous small patches; and if these are removed, shallow indentations remain, resembling marks produced by small pox. This effect is supposed to be produced by the different galvanic conditions of the different qualities of metal, which are only mechanically mixed without being chemically combined.

Pipes cast from iron of this description, have frequently as good an external appearance and stand the required proof, as well as those made from the best No. 2 pig iron; but when acted upon by water, an irregular oxidation begins, and exhibits itself in the interior, in small patches and nodules, which in some cases, have increased in number and size, to such an extent, as seriously to reduce the amount of water passing through them. In some large pipes, belonging to the Boston waterworks, the flow was diminished from this cause twenty per cent in less than three years; and at the waterworks in Grenoble, in France, some of the pipes were found, after seven years use, to be diminished in capacity, from the same cause, nearly one half.

The cause of this rapid oxidation, appears not to have been suspected, until a comparatively recent period; Mr. Faraday having

been the first, so far as we are informed, to discover and make it known.

The phenomenon seems to have attracted attention in France, for some time, and was examined by M. M. Payen, Gruymard and Vicat, the two latter of whom, (not suspecting the real cause of the evil,) recommended as the means of preventing it, an internal coating, of thin hydraulic lime mortar, applied by means of a maulkin or swab: and it was for some time believed that this was a complete protection. But a pretty extensive trial of this material in Great Britain, seems to show that very little, if any advantage results from its use: the thin and slightly adhering coat of hydraulic mortar, being either removed by the action of the flowing water, or when applied to pipes cast from metal readily attacked by oxygen, the water finds its way through the lining to the iron, in sufficient quantity to produce nodules of oxyde, which increasing in extent and thickness, threw off the lime in scales. For these reasons, it is injudicious to use the pipes for conveying or distributing water, which are cast from iron of different qualities mixed in the furnace, as it is by no means certain that they will continue to deliver the quantity due to their dimensions; or that they will not be much more rapidly destroyed by oxidation, than those made from properly selected iron, of uniform quality.

For making the best pipes, No. 2 pig iron should alone be used, and this should be carefully assorted by the workmen; and all the iron used at any one casting, should be as nearly of the same quality as possible: and it will be found in practice, that pipes made from the hardest iron, that can be conveniently drilled or cut, will be least liable to accidents while in use, as well as the most durable.

On motion of Mr. Tillman, seconded by Mr. Butler, the thanks of the Club were voted to Mr. Ward, for his valuable treatise.

Mr. J. L. Mott, was requested to speak on the "iron castings." He said that his long experience is iron, confirmed the remarks of the chairman, as to the great difference in its qualities. He had succeeded best by means of the hot-blast with some irons, and best by the cold-blast with other irons. They often look equally well, but he examines all the iron delivered at his furnaces very

carefully. They differ much in strength, and some are hardly manageable, splitting when they cool. I have found it difficult to cast perfect railroad wheels, on account of the unequal cooling of the several parts thereof. I have confined the rims in iron rings, which chills the exterior part of the wheel. I have found that by mixing several sorts of iron together, I improved all my castings.

The Secretary desired Mr. Mott to speak of the progress of our iron masters in hollow ware, a question of deep interest years ago and now.

Mr. Mott—We have made for several years strong and light hollow ware, equal in all respects to the best made in Scotland or elsewhere. My bathing tubs for adults, full size, are of cast iron, and weigh but two hundred pounds; they are but one-eighth of one inch thick. I have cast them one-sixteenth of an inch thick, and they buckle and bend almost like sheet iron. I have often used Scotch iron in my works heretofore, but none since last March.

Mr. Tillman adverted to the unequal dilation and contraction of iron and other metals. Zinc is remarkable for its great contraction in cooling. Car wheels of 60 to 100 different forms have been made with curved radii and otherwise; but there is always difficulty on account of unequal cooling of the different parts of the wheel.

Mr. Mott—Cores of sand, with some vegetable matter in them, as rye flour for instance, makes the core sufficiently fine, and the flour being burned by the melted iron, makes the necessary room for the contraction on cooling. American iron is the strongest. On melting the Scotch iron, I lose eleven per cent of it, but of our American iron, only from one to six or seven per cent. By the cold blast, I melt about six pounds of iron with one pound of coal.

Mr. Devyr, of Brooklyn, asked—Why not use cold air on the various parts of a cooling casting so as to cool all the parts equally?

Mr. Butler had sometimes found the plates he uses in the construction of his iron safes, burst in cooling, and fly some distance

from their moulds. He supposes that accident to resemble the well known Prince Rupert's drop. No doubt it is so.

Mr. Sibley, an experienced founder, adverted to the practice of covering and uncovering cooling castings, as of some value. Soft iron wastes most in the furnace.

Mr. Butler called to notice the centrifugal casting of pipes by having the mould perfectly horizontal, and made to rotate with high velocity when the melted iron is admitted in quantity adequate to the formation of a pipe—that in theory—this centrifugal force will distribute all the melted iron with precision in the mold.

Mr. Cohen had noticed this experiment in Baltimore. It was of doubtful value.

Mr. Butler moved that Mr. Mott be requested to prepare a paper on iron castings, for the volume of Transactions. Carried unanimously.

Mr. Devyr exhibited and explained his invention for placing coal barges in a strong cradle, which is drawn out of water on to a coal yard, and at a suitable spot rolled over so as to drop all the coal at once, instead of keeping the barge two days to discharge her cargo, as now required. The cradle is to be strong enough, and inclosed in circles, so as to roll over very readily, and keep the barge from injury by straining.

The committee on questions, give for the subject at the next meeting, "Steam-plows."

The Club then adjourned. H. MEIGS, *Secretary.*

January 13, 1858.

Present—Messrs. Pell, Tillman, Fisher, Leonard, and others—fifteen members.

The regular chairman, Thos. B. Stillman being absent, Mr. Pell took the chair. H. Meigs, Secretary.

The Secretary stated that we were indebted to London for gratuitous copies of the Journal of one of the greatest institutions of the world, viz: The London Society of Arts, which has associated with it 350 societies, thus having the enormous advantage of this vast amount of thought and experience.

[Journal of the Society of Arts, London.]

Iron.—This wonderful metal is still apparently not well understood, although used from the beginning of the world.

Some combinations and phenomena, that occur among the elements engaged in the manufacture of iron and the conversion of it into steel.

Yet everywhere is this the received formula of the composition of steel, namely: That it consists solely of about ninety-nine parts of pure iron, combined with one part of carbon; other elements are accidental and foreign. The steel makers of Sheffield do not believe in the stereotype doctrine of the encyclopedias. Saunderson, one of the most experienced steel makers, does not believe that "steel is merely iron combined with about one per cent of carbon, or that malleable iron is without any carbon at all, or with less carbon than will form steel. The outer coating of common chilled cast iron is often as hard and untouchable by the file as the best tempered steel."

An experienced steel worker, a razor, watch spring, needle or surgical instrument maker, takes a piece of unworked rough, black steel, he balances it on his hand, taps it with a hammer, brings out its ring, and its peculiar intonation, is (compared with iron,) to his practised ear, a specific and infallible test of its kind and quality. He next makes it red hot, tries how it draws, that is by repeated blows, elongates the bar, watching as he proceeds the texture of the metal, its adhesiveness, flexibility, indisposition to scale, the character of the marks inflicted by the hammer, &c.

STEAM PLOWS.

Mr. Pell—In the year 1849, Mr. James Usher, of Edinburgh, invented a steam plow, consisting, firstly, in mounting a series of plows in the same plane, around an axis, so that the plows came successively in action; and secondly, in applying power to give rotary motion to a series of plows for tilling the earth, so that the resistance of the earth to the plows, as they entered and travelled through it, caused the machine to be propelled, making it act, when the steam power was applied, in the same way that paddle wheels do in water; the resistance of the earth being greater than the water, the power obtained was proportionally

more. The motive power, at a short distance, resembles a railway engine without its tender, moving in the reverse direction, with the revolving plow shares placed directly behind the funnel. This machine was different from most of the steam plows before invented, as they had a system of stationary engines and endless chains. The locomotive made use of by Usher, was a ten horse power, with four plows affixed; but it was adapted for six, and might have worked ten without an increase of power. The plow shares penetrated the soil from seven to nine inches, and tore up the loam as loosely as a garden soil.

At the trial of this plow forty gentlemen were present, and determined that, with a few improvements, the locomotive might be made to turn and move about so as to tear up every inch of soil in a lot. And further, that two skilled men could manage it and drive six plows at once. The cost was about $2,500.

In one of the experiments, harrows were attached, and it was suggested that, were a broadcast sowing machine added, all the spring work might be accomplished by one operation.

In 1851, a Mr. Williams, of London, discovered that a common farm engine, of five horse power, would grind the grain, cut the chaff, thresh the crop, saw the wood, irrigate the farm, and plow the land.

By propelling six plows at a time, according to the nature of the soil, and plowing twenty yards of land in width, without moving the engine, and draw the plows in furrow backwards as well as to her, by means of a pulley fixed in a frame at the other end of the field. It will not be a difficult task to satisfy practical farmers, that if we plow by steam, it should undoubtedly be accomplished by the farm engine; and a six horse power engine will be ample for all those purposes.

Mr. Williams says such an engine will draw six plows two miles an hour, plowing through land from seven to nine inches deep, both to and from the engine. And when the land, twenty feet in width, is plowed, the engine will propel herself and the machine, to the next land. The opinion of the gentlemen who examined Mr. Williams' machine, was divided on the question of expense, and they concluded, that up to that time, no one had

reached anything like that perfection which would warrant their coming into common use.

At a meeting of the London Farmers' Club, in May, 1855, every attention and encouragement was tendered to any man who would perfect such a possibility.

In 1857, Mr. Boydell exhibited an eight horse power engine, that weighed, including water, nine tons, with which he could cross the roughest land; go up steep inclined planes; move immense weights; overcome great resistances, in the most astonishing manner. He steered it by means of a tiller and steering wheel, like those of a vessel. This machine accomplished the whole work itself. In plowing side hills, the machine goes up light and works downwards, by which means, considerable inclines may be operated upon with facility. It drew ten plows, in light land, six inches deep, with a speed of two miles per hour. In an attempt, with the dynamometer attached to Biddel's cultivator, the instrument broke at forty hundred weight.

The next steam plowing machine is Fowler's, for which he received the gold medal, at the Paris agricultural exhibition. It moves eight plows, and plows eight acres in a day of ten hours.

A Mr. Smith, of Little Woolstone, has invented a plow which he works with a common seven horse power, portable engine, and a stationary windlass. Two three-quarter inch ropes lead from the drums on the windlass round four pulleys, anchored by means of large toothed anchors; two of which are fixed, and two shipped as the plowing proceeds.

Mr. Fisher read an article from an English work called: Sewell on Steam and Locomotion.

The first trial of the steam plow was made in 1836, in Scotland. In 1831 it was spoken of in parliament, and Lord Derby, with great zeal, attempted to advance the project. Lord Willoughby paid much attention to the subject, and made many improvements in the steam plow. Mr. Fisher then introduced to the Club Mr. Thomas Dyack, who had recently invented a steam plow on a new plan.

Mr. Dyack exhibited his plan, saying that it is an acknowledged fact that steam plowing was a much better system than the old

style, inasmuch as it was less labor for man, and saved the lives of useful animals, being much cheaper every way. He then explained his machine and its peculiar structure, at some length. Its construction is similar to a locomotive, only on a miniature scale. Four plows abreast follow the locomotive; then comes a tender containing fuel; connected with this, is a harrow and seed planter, so that all the operations, plowing, harrowing and planting, can be conducted at one time. Only one man is required to work the machine.

Mr. Tilman remarked, that it was astonishing that England had taken such decided action in reference to steam plows, as that kingdom swarmed with laborers whose wages were a mere trifle; but he thought there was little danger of the plows driving out the laborers. He spoke of a plan consisting of two engines, one on each side of the field, drawing the plows from side to side by means of wires. Also of the plan of the locomotive running about the field drawing the plow, harrow, and feeder. He thought the weight of the machine would be an insuperable objection; mentioned the State of Illinois as specially adapted to these plows, if they can be only made practicable.

The President made a few remarks on the subject. Mr. Fisher moved that Mr. Dyack be requested to leave a plan of his invention to be placed in the archives of the society, which was carried.

The subject for the next meeting is, "The cut-off of steam engines."

The Club adjourned. H. MEIGS, *Secretary.*

January 27, 1858.

Present—Messrs. Tillman, Stetson, Waterman, Fisher, Butler, Haskell, Genio Scott, Allen, Wm. B. Leonard, Roosevelt, and others—twenty members in all.

Mr. Thomas B. Stillman being absent on account of indisposition, Mr. Tillman was in the chair. Henry Meigs, Secretary.

The subject being "The cut-off in steam engines," several members requested Mr. Stetson to open the discussion.

Mr. Stetson illustrated by drawings on the black board the science of cut-offs, and explained their construction and operation.

The object of a cut-off is not only saving of steam, but the engine, by relieving the engine from the effect of the severe full stroke of the piston, and giving a well governed stroke to the piston, an effect which is also gained by the action of expansive steam below the piston, which also meeting the power above it, neutralizes the shock or pounding, always otherwise felt and heard. He illustrated Sickel's cut-off, which has recently attracted the attention of engineers. This valvular arrangement acts by upper and lower valves in a cylinder in which the steam above and the steam below operate against each other, thus suddenly stopping the admission of steam to the main cylinder, at such point of the stroke as the engineer may select—say at one-eighth, one-fourth, or at half stroke. But Mr. Stetson thought still that the stroke might be regulated in the cylinder, by steam admitted into it below the piston and acting expansively *toties quoties*—as often as desired—as by the slide valve, which may be at will made to lap so as to cut off the steam at one-third of the stroke, leaving what steam is already admitted above, the piston to act expansively, and also, if more expansion is required, then by contracting the steam port, what is termed wire drawn steam—that is a slender opening for it admits steam enough to finish the expansive power above the piston, and thus complete the force of the stroke without shock. In the Cornish engine, the steam is sometimes cut off at one-twelfth of the stroke.

Mr. Roosevelt—The action of that engine is excellent. Its down stroke slow, uniform to the bottom, and then a much more rapid rise. It does not attempt its power to lift suddenly, but most naturally begins with moderate and then increasing force to overcome resistance.

Mr. Meigs had examined the noble Cornish engine, in operation, at Belleville, New Jersey, where near the bank of the river, it forces the water up for supply of the Jersey city aqueduct to the summit of the hill near the city, above 100 feet high. John D. Ward of Jersey city, superintended, directed and finished the whole of that noble aqueduct, for less money than his original estimates on which that work was undertaken.

Mr. Fisher made drawings and gave remarks, showing his full science on the subject.

Mr. Waterman was called out repeatedly to comment on the drawings and views of others, leaving no doubt of his ability as a steam engineer of close study and experience.

Mr. Tillman was pleased with the automatic cut-off, which being operated by the engine itself, could not act otherwise than correctly, far more so than any engineer could do.

The Club adjourned. H. MEIGS, *Secretary.*

February 10, 1858.

Present—Messrs. President Pell, Stetson, Waterman, Cohen, Fisher, Butler, Larned, Tillman, Jos. Dixon and Mr. Cleveland, of Jersey City, Jordan L. Mott, of Mottville, Veeder, Munson, D. Smith, of the Times, and others—twenty-three members.

Mr. Joseph Dixon, of Jersey City, read a paper upon Photography:

Ever since the great discovery, by M. Daguerre, the inventive genius of the world has labored unremittingly, and with varied success, in subduing the difficulties, simplifying the processes, of working and extending this wonderful art to the various useful purposes of life.

The mathematician and mechanic, have united their efforts in the production of optical and mechanical apparatus; while the magic hand of the chemist has furnished the means of rendering the light drawn pictures of nature, real and substantial things of life; "as tangible to feeling as to sight."

Do we read a description of cities of far distant countries; of the ruins of Balbec; of Palmyra; of the pyramids of Egypt; of the ruins of Pompeii. Almost instantaneously the wand of the photographer waves over the scenes, and we behold, not a mere picture, a sketch by the hand of the most skillful draughtsman, but we have before us the very impress of the thing itself; every rock, and stone, and grain of sand, each crumbling ruin with all the markings of time; even the very individual leaves of the creeping ivy, are placed on exhibition. The living inhabitants of every clime and place, with all their peculiarities and domestic habits, once summoned by this powerful talisman must

appear, not disguised, but in verity. Here, the Laplander, drawn by his dogs in a rude sledge on the frozen snow, takes his seat beside the dark skinned African who is surrounded by the ever verdant and luxuriant foliage of the torrid zone. Each animal, from every part of the earth, sea, and sky, and the products of every clime and country, may pass, at pleasure, in review before the astonished admirer, as no artist can delineate. History, geography, architecture, mineralogy, and agriculture, are not alone benefited by it; but the embellishments of manufacturers in the various arts have received a new impetus which carries them forward with an increasing force; each different branch is being enlarged, and at the same time lending its aid to the perfection of the whole. Painting, engraving, lithography, poetry, glass staining, calico printing, and other branches, indicate the progress they have made in a manner not to be mistaken.

One cannot pass along Broadway without being attracted by the beautiful photographs, colored and plain; pastel, colored and painted in oil, which are placed in the doors of artists to proclaim the excellence of the work within.

I might have mentioned before, that astronomy has not been passed by without benefit. Whipple, of Boston, has given to the world a map of the moon, executed by herself, while others have partially succeeded in taking impressions from the fixed stars.

I do not intend to give the *modus operandi* of the various processes, nor to describe the photographic apparatus most in use, but it seems only justice to call your attention to the astonishing successful labors of our fellow citizen, C. C. Harrison, in the manufacture of that most difficult of all work, the Camera; these are not behind the best optical instruments made in the world, although Mr. Harrison has not the mathematical assistance of a Petzval, nor the early training of a working optician. His success will be best appreciated by the man of science, who well knows the difficulty of working achromatic lenses of such enormous diameter as three, four and six inches, to less than one foot focus; yet in these he has contrived to reduce the spherical aberration to a mere fraction, and the chromatic almost to a perfect nonentity. Some of Mr. Harrison's instruments are even much

larger, being not less than nine inches in clear aperture, the largest ever made. The demand for such very large lenses, has arisen from the desire for life size photographs, several of which graced our exhibition at the crystal palace last autumn. The cost of such large instruments must necessarily debar many artists of small means from their use; and this having been felt, has awakened the inquiry, "how shall we execute these larger pictures without the means to purchase the larger apparatus?" But even with the largest apparatus, we cannot produce pictures the size of life. And the special object of this paper is to explain the best means of attaining that end.

The Magic Lantern, once the plaything of our youthful days, was brought out, but the light was found insufficient, and it was returned to its resting-place. The Solar Microscope was then taken up, it supplied the deficiency, and seemed the very thing for the purpose. A negative collodion picture was put in the place of the common slider, and a picture at once was impressed upon the sensitive medium: it required a longer time of course, to make a picture of such magnified dimensions; but as the object could be kept still for any length of time, that was of little consequence. But the lenses of the common solar microscope being too small, larger ones were substituted, and thus full life-size pictures were produced from the common size negative on glass; these were put into the hands of the painter, who, now having something to work on besides a blank canvas, was enabled to bring out a more correct likeness, and with greater rapidity, than ever before: still the outline, even on this was not perfect, although it answered the ends of the painter better than nothing; and it is in this way the large full length portraits are made. Having fitted up an apparatus for exhibiting these large pictures to my friends, I was not a little mortified to find that my friend Mr. A. B. Moore, a celebrated portrait-panter in this city, has had a much better arrangement in use for a long time. We all know that the magnified picture was never well defined. This arose from one of those stubborn laws, well known to the optician, the inflection of light, by which a pencil of rays, passing near an opaque body, is deflected and dispersed.

As an illustration (for there are some here who, probably have not paid much attention to the science of optics), I will suppose that a room be dark, and a small opening in the shutter through which a very fine pencil of light enters; at a distance from this is placed a white screen, which receives the light and exhibits a bright spot, but upon close examination, it will be observed that the spot is not like a piece of white paper cut out and fixed upon a black ground, but exhibits an indistinct outline, with colored fringes on each side; and should a wire or thread be now drawn through this beam of light, close to the opening, the shadow from it will be far from sharp, but will exhibit a blurred image colored on each side by fringes in the same manner, and these mixing with the fringes of the circle, give rise to that indistinctness which may be seen on all images thrown on a screen by the solar microscope. Every device that mathematics could suggest in the configuration of the lenses, have proved ineffectual in correcting this species of imperfection. But to return to the apparatus of Mr. Moore, in which this difficulty is not encountered, and which I will now describe. The light is not passed through the negative, and consequently near to innumerable opaque bodies, but is reflected from the surface, thereby avoiding any interference with the rays in their passage to the tablet or canvas. This apparatus is so arranged that the sun-light falling on a mirror, is reflected, and condensed, upon a small daguerreotype or other picture, by which means it is strongly illustrated; directly in front of this is fixed a common small size camera tube, so situated that its axis is at right angles to the plane of the picture, and being adjustable, a very sharp image is thrown upon the tablet, free from colored fringes and overlappings.

The difference between the two methods will at once be seen to consist in the fact that Mr. Moore receives upon his canvas a reflected image, retaining all the perfection and sharpness of the original, while by the method now used, a transmitted image is received, with all its attendant imperfections. As a familiar illustration, it is well known to the practical photographic printer, that should the glass negative be placed in the printer's frame with the collodion up, and the paper placed upon the opposite

side, that the rays of light passing by the opaque lines are dispersed, and a blurred and indistinct impression would be received, instead of the clear, sharp one he desired, and that he always aims to press the paper as closely against the collodion as possible in order to produce the proper effect. I say, therefore, that it is vain to expect a sharp enlarged picture from a negative by transmitted light, however perfect the lenses may be figured; while by reflection, an ordinary lens will, with the exception of spherical aberration, produce a clear, well defined picture. By the method Mr. Moore employs, positive collodion pictures, daguerreotypes, engravings, and all pictures, are alike eligible, whether opaque or transparent; while by the usual method a very dense negative on glass is the only kind that can be enlarged, and even then, much light will pass through the silver film and assist in destroying the distinctness of the resulting picture.

The form of apparatus which was invented by Mr. Moore, over eleven years ago, has been constantly used by him ever since, and also by several of his personal friends in the same profession, to whom Mr. Moore, with a liberality worthy of imitation, gave the plans; and by his permission the door is now thrown open to the public, with the hope that he has contributed one *Moore* stone to the building of this magnificent structure.

I am aware that the evening is devoted to the discussion of another subject, and will not, therefore, longer consume time nor tax your patience. I feel an interest in this art, for the degree of perfection and usefulness it has already attained are truly wonderful. But I assure you that the various developments that have followed each other in such rapid succession, and that have excited in the world so much astonishment and admiration, are but as the tinted leaves that surround the opening bud, whose higher colors and greater perfections the warm sunlight of man's genius shall in time unfold.

W. B. Skellington, of New-York, illustrated by drawings on the black-board, his new plan for relief of Broadway travel. A net work of wrought iron upon a concrete bolted to the present pavement, and to the sides of the street. The iron, perhaps inch size, wrought together in meshes about three inches square, for the hoofs of horses to have firm hold. He said nothing about the wheels.

The President then called up the regular subject—"Cut-off on Steam Engines."

Mr. S. D. Williams, Civil Engineer, spoke of the advantages of the variable cut-off, which is regulated by a governor of the steam, admitting more or less, automatically, and by the same mechanical management the fires in the furnace and the pressure of the steam may likewise be governed, and far more accurately than by engineers. Let steam into the cylinder one-half, let that then act by its expansion, &c.

Mr. J. K. Fisher explained the use of the link motion in locomotive engines as applied to Stevens' cut-off, showing its easy action and its value in preserving the machine from injurious shocks. Engineer Copeland made that application.

Mr. Stetson had remarked the application of cam-motion to govern cut-offs in our western States.

Mr. Leonard—The steam engine having become the great motive power of the world, it has called forth the genius of mechanics and inventors for the better and more economical working of its parts. The great variety of plans for cutting off the steam in the cylinder in order to realize the advantage of the expansion of the steam, and the great variety and forms of valves, size of ports, &c , is occupying the attention of the public. There is evidently a great want of method in working both steam boilers and steam engines, and a lack of knowledge with builders of engines in adjusting all the parts to give the greatest amount of power with the least amount of fuel; I, therefore, have applied a dynamometer to the steam cylinder, which has a small cylinder, say from one to three inches diameter, a piston vibrating from one and a half to two inches, held against the pressure of steam by a spring equal to the power applied; a rod attached to said piston, connected with a traverse wheel, which rises from the centre of a disk-wheel (against which it presses) in proportion to the power of steam in the cylinder, connected with which I have clockwork that sums up on a dial the power applied to the piston, *less the back pressure*, giving for any desired period the actual horse power of steam used. I have a pencil attached to this machine, and a slide board connected with the cross head, on which a paper may be placed to

take a card at any time. This dynamometer is driven either by the engine or by clock-work, and is an important appendage to steamboats as well as land engines, registering all the power used. I place a similar machine on the boiler that will commence registering as the steam is generated, and continue to sum up on a dial all the steam that is made during the day. This machine is driven by clockwork. This being known, and having the weight of coal, the comparison made one day with another of the amount of fuel consumed, the quantity of steam made, and the power expended at the engine, holding the fireman and engineer to account for the manner in which the fires are regulated and steam applied; with these checks upon the employees the interest will be increased to excel each other, until the entire labor which the present system requires will be saved in the cost of fuel and economy of steam.

Mr. Tillman, from the committee on the selection of questions, stated that they had selected for the next subject "Roads and Pavements."

At 10 o'clock P. M. the club adjourned.

H. MEIGS, *Secretary.*

February 24, 1858.

Present—Messrs. Pell, Leonard, Geissenhainer, Cohen, Veeder, Sheppard, Stetson, Chambers, Seeley, Dixon, of Jersey City, J. K. Fisher, Jordan L. Mott, Tillman, Alanson Nash, C. B. Morse, Lockwood, Hon. R. S. Livingston, and others—34 in all.

President Pell in the Chair. Henry Meigs, Secretary.

The Secretary remarked that as Roads and Pavements was the subject before the Club at this meeting, he had made a brief selection of ancient paved roads by way of introduction. For it was well, in endeavoring to improve in anything, to know what has been done, in order to avoid the mistakes, or to avail ourselves of the merits of works which fully employed the heads and hands of millions of our predecessors.

A brief notice of the most distinguished works of this kind will perhaps be useful. I therefore select the following for consideration, viz:

The invention of Paved Roads appears to have been by the Carthagenians, from whom the Romans borrowed it in their long Punic wars, and greatly improved them. Their two first paved roads were the Appian and the Flaminian and Aurelian. The first was made 2,000 years ago, and is in parts good yet. Julius Cæsar, before the birth of our Saviour, made paved roads from the city of Rome to all the chief towns—one through Spain and France, as far as the Alps, over a thousand miles long—a paved road through Germany, and to Constantinople, and another through Hungary, to the mouths of the river Danube, another through Asia, through Sicily, Corsica, England, Africa, Sardinia. These gigantic works were not mere paths for the feet of horses and wheels of carriages, on the natural surface, but equal to those of modern engineers, firm, durable roads, through forests, through excavated hills and mountains, over raised valleys, rivers on bridges, over drained marshes, &c.

The Chinese, 1,300 years ago, made suspension bridges over chasms 500 feet deep, and horsemen rode over them!

The first artificial road of England was made by the Romans. A grand trunk road from north to south, and another nearly at right angles with it from east to west, with branches from these trunk roads, in every direction. The Roman road called Watling street, was from Rideborough, in Kent, and through London to Chester. Ermine street, so called, was a Roman road from London to Lincoln, to Carlisle, and thence to Scotland. Fossway was from Bath to Ermine street. The road Ikenald was from Norwich to Dorsetshire. When the Romans left, the Britons let these roads decay, and they made no new ones. For many centuries the roads became rude paths for horses and pedestrians over natural ground, much like the savage tracks and paths of American Indians. Charles IId first, by law, established a turnpike!

In modern times Telford made a solid basis of stones set by hand, a close firm pavement. Those in the middle of the road were set seven inches deep, and smaller as receding from crown to sides; roadway thirty feet wide; insterstices filled with stone chips, and general surface hammered into uniformity. It produced intolerable dust in summer! The rapid wear of every sort of pavement in Oxford, Holborn, Fleet street, the Strand, &c., suspension of travel for repairs, dust in summer and mud in winter. This induced a trial of wooden pavement in Oxford street in 1839, which, after several months trial, was laid through the whole street. The idea of a pavement of wood is not new. In northern Germany, and in Russia they have been long in use. Some of the main streets of Petersburgh and of Vienna have long been paved with wood.

It was tried in New-York, and was another failure!

C. B. Morse exhibited and explained his patent machine for tonguing, grooving, and finishing floor planks on both sides at one operation, saving half the usual work.

Mr. Loth, of the firm of Roth and Leuthe, of Hartford, Conn., exhibited, explained, and operated their patent animal trap, by which an animal finding on its bearded fangs closed, suitable bait, bites at it, and instantly on pulling two balls are fired down his throat. Or if desirable to take him alive, omit the balls, and when he pulls the bait the fangs open and hold him fast, with his mouth wide open, so that he can be secured while yet alive. The advantage of the balls is to leave the skin unhurt.

Henry Schreiner, Jr., of Berrysburg, Dauphin Co., Penn., exhibited and explained his patent "Combined Reversible Corn Plow and Harrow, and Seed Plow."

The President called up the regular subject, "Roads and Pavements," and made the following remarks on the subject:

I once imagined that a soft and yielding foundation for a road, was far superior to an unyielding and firm one; for the reason that a yielding one would be more elastic, and thus prevent the covering from being worn out, and crushed by the passage of

heavy vehicles over it. But from long experience, I am now fully convinced, that the more solid the substratum is, the better will be the road.

Roads are generally classed according to their foundations:

1. Those without any artificial foundation.
2. Those with a foundation formed of concrete.
3. Roads paved with stones and covered with stone chips.
4. Roads paved with wood.
5. With iron.
6. Stones laid in concretes; and these may be subdivided according to the material made use of by the constructors.

Nearly all the roads in our country will come under the first class, from the fact that it is by far the cheapest mode, as far as first outlay is concerned.

There are, in England, twenty-two thousand miles of such roads, regularly turnpiked, yielding, annually, seven millions five hundred thousand dollars. The repairs, improvements, and other charges amount, annually, to two hundred and fifty-five dollars per mile; or five millions six hundred and ten thousand dollars; leaving one million eight hundred and ninety dollars profit. Some of these roads are Macadamized through towns where they answer a good purpose; but they would not do in cities, because the traffic is vastly greater in weight and amount. And furthermore, we travel with great speed upon narrow wheels, cutting deep ruts, requiring constant expense to repair, which, in the end, would cost more than paved streets.

Blackfriar's bridge, in London, was once Macadamized, and it cost five thousand dollars per annum to keep it in repair. It is now paved; and the annual average is six hundred dollars a year.

It is always well so to build your road, as not to be compelled to incur a permanent annual outlay of money; and this can be accomplished by laying a concrete or paved foundation. Circumstances, however, alter cases, and it sometimes becomes necessary to build a road upon wet ground. When this is the case, never fail to cut deep ditches on the side and cross the road, at inter-

vals, with underdrains. And where the ground is exceedingly soft, cover it with a layer of brush from six to eight inches in depth, before the road materials are put on, or your labor will be thrown away.

The ancient Romans constructed their military road in France, by forming a foundation of concrete, according to our second class, composed of gravel and lime, upon which they placed a pavement of large stones; and they have endured the wear and tear of fifteen hundred years.

A concrete may be made of gravel and lime, in the proportion of four gravel, to one lime, made upon the road, and spread to the depth of five or six inches, according to the traffic; cover this with five or six inches of coarse gravel, before the concrete hardens; when in a few hours the two beds will unite and become perfectly hard from the complete wedging of the coarse pebbles together.

The third plan is to pave a road with stones, thus: commence at the sides and lay a layer of stones two and one-half inches in depth, and gradually increase until you reach the centre. Say fifteen feet from the commencement, where, let them be seven inches in depth, and graduate them to the opposite side in the same manner. Then break off all projecting inequalities, and fill up the spaces with stone chips, placed by hand, and wedged in with a light hammer. And that there may be no misapprehension with regard to the stones used for wedging, I would state that they must be angular; as round pebbles would not answer the purpose at all.

Then again an admirable road may be formed with angular stones alone, which may be obtained by breaking up granite, or the hard pebbles usually found on the shores of streams. The harder they are, of course the better, as sandstones, ordinary limestones, &c., would not resist the action of heavy wheels. After the road is properly trunked, spread these angular stones on to the depth of six or seven inches, and cover them with coarse gravel to the depth of two inches, if the travelling public grumble; but if they are good natured, and will inconvenience

themseves temporarily, by using a rough road for a short period, the stones will become united into a compact mass, which the gravel prevents, and thus form a permanent and admirable road. The force of traction per one ton on the former would be about 150 lbs.; on the latter 50 lbs.; when smooth 35 lbs. Road-makers should keep in view that the principal object most desirable on all roads is the diminution of the actual resistance a vehicle opposes to the tractive power, which is accomplished by making the surface of the road perfectly smooth. Resistance to the tractive power is greater on a soft than a hard road. This may be demonstrated on mathematical and mechanical principles. The traction is always proportional to the road, and inversely proportional to the wheel's diameter. In Broadway, as now paved, the resistance is entirely independent of the width cf the tire if it is more than three inches. Traction increases with velocity. When roads are made with gravel alone, roadmasters generally insist upon having it sifted until it is perfectly clean. From experience I have come to the conclusion that this is wrong, from the fact that no binding material is left to hold the thousand fragments together, and the gravel cannot become solidified immediately, but if the adhering loam is permitted to remain on, the interstices between the gravel is filled up at once, and the road may be opened for traffic. Engineers usually endeavor to make a road as level as possible, without taking into consideration the fact that a horse will travel with much more ease on a road alternately ascending and descending, than on one perfectly level, or gradually ascending.

Our fourth class consists of pavements made of blocks of wood, which have been tried in Europe, Russia and America, with bad success, on account of the immense sums of money annually required to keep the blocks in repair. This was owing to the want of proper foundations. They were likewise found slippery at certain periods of the year. Still this might have been easily obviated by a plan that I will suggest before I complete my remarks.

In the experiments tried a few years since in Broadway, near Chambers street, I observed that the hexagonal blocks which were placed with the ends of the capillary tubes exposed seemed to wear remarkably well, and I could only account for it by supposing that the iron from the wheels wore off, and filled the tubes with grit, thus not only preserving the wood, but at the same time converting it into a sort of file, with which to wear away the substance of its strong neighbor, iron. Then, again, the perishable quality of all varieties of wood, is owing to the fact, that they abound in nitrogen, which in this case, the blocks being placed in a vertical position, was washed by the rains, through the tubes, into the earth, which had a strong affinity for it. And upon the whole, I am inclined to believe, that wooden pavements, in some shape or other, will eventually supersede all other varieties, and become the favorite material in all great thoroughfares. The inconveniences produced in London, by reason of the wear of all kinds of pavements hitherto adopted, causing frequently a suspension of intercourse while repairs were going on, then they in turn were dusty, muddy, intolerably noisy, &c. This excited much inquiry as to the feasibility of building some road sufficiently strong and durable to accommodate the enormous traffic, and at the same time to prevent the necessity of constant repairs. The problem was solved, and a wooden pavement throughout the length and breadth of Oxford street was the result, and this plan has been adopted in many other thoroughfares in London, also in Vienna and St. Petersburgh.

I have seen the following plan somewhere for an iron pavement, which consists of circular cast iron rings, about twelve inches in diameter, and six inches deep, divided into seven compartments, one in the centre, and six surrounding it, rendering these apertures sufficiently small to prevent the catching of the hoof of a horse. The upper edge of the ring, and all the partitions are thickly indented with semicircular depressions, about an inch in depth, a protecting hub on one side of the ring, and a corresponding depression on the other, fit together, and thus lock the whole road into one solid framework; the indentations on the

upper edge of the frame, with the gravel employed in filling the whole to the surface, secure a good foothold for the horse. The advantages of this pavement are economy in wear and tear, great facilities for removal and relaying, absence of dust in summer, not slippery in winter, and not productive of much noise.

In constructing roads, or streets, through cities, where there is much traffic, it will be found necessary to pave them with wood, iron or stones. The advantages of these materials over Macadamising are great. When the latter are exposed to much traffic, they become rutty, and require constant repairs at great cost; then again in dry weather they are excessively dusty, and in wet weather muddy. The only advantage that it seems to possess over stone or iron is, that less noise is produced by wheels upon it.

In estimating the cost of maintaining a Macademised road, I have concluded that the entire superstructure would necessarily have to be renewed annually, the cost of which renewal would be about five shillings the square yard, which is more than double that of making and keeping in repair a paved street, without taking into consideration the extra cost of cleaning a Macadamised road, which is great, from the fact that hundreds of tons of stone material are annually ground to dust by the travel, and must be removed. These roads are much used in Great Britain, and are superior to those made in the same way in other countries, from the fact that she has a great abundance of materials admirably adapted, and their ground is firm, being chiefly composed of sand, gravel and flint; consequently the water filters readily through it, and leaves the road comparatively dry immediately after rain. Then again, notwithstanding their climate is habitually damp, they are not subject to the heavy torrents of rain, which causes such immediate destruction to the roads of other countries, and particularly ours. Still, if we adopt Macadam's rule, and form a strong, smooth and solid artificial flooring, capable of carrying great weights, and over which vehicles can pass without meeting any impediment, they will stand the storms.

In laying pavements, the first and most important object should be to form a foundation that will not yield. Without that, all pavements will subside when heavy loads pass over them, even if they are one foot thick, and have the iron or stone surface dove-tailed together. In Paris they adopt the plan of laying new pavement on the tops of the old, which they cover with gravel, and bed the new stones in it. This plan answers admirably.

The beginning of roads commenced when God made the first animal, and he began treading with his feet, and thus made a road spontaneously. Men first made foot paths, then widened, hardened and smoothed them, until they became thoroughfares for villages, towns, and finally cities. The Indian paths of America, at first, only trod enough to permit one savage to follow another, have ended in streets like Broadway. This art, and its achievements, will advance and keep pace with civilization. All former people have had roads adapted to their ingenuity and industry.

History notices the roads of ancient Greece, which were proportional to their enlightenment. In ancient Egypt, horses and chariots were common, and they must have possessed good roads. Phœnicia, Syria, Assyria and Babylon, have left antique proof of well frequented roads.

The Romans were celebrated for their military roads, remains of which may be seen throughout what once constituted her immense empire. I have traversed portions of the Via Appia, which, departing from Rome, extends to the distance of three hundred and fifty miles, and terminated at Naples. It was composed of square blocks of freestone, each eighteen inches square, and laid on a causeway twelve feet wide. This road, now eighteen hundred and twenty years old, is still, for miles together, as sound as the day it was completed.

And so, gentlemen, will be the splendid pavement in Broadway three thousand years from this day if the ruthless hand of the destroyer is kept from it. There is no pavement on the face of this earth superior to it, and future generations of men will bless, with the same ardour that you curse its founder, who, although

ruined and driven from his native city by politicians, has built for himself a monument that will endure long after every vestige of this present great city shall have crumbled into dust.

It is at times slippery, I will admit, but this is an evil that can easily be overcome without in any way interfering with the present pavement.

Five years since I suggested to this Institute an invention that will overcome the difficulty, consisting of a horse shoe, to be placed permanently on the foot, and only removed when necessary to pare it; this shoe is to have five case-hardened steel points; one at the toe, one on each side, and two at the heel, to be attached with a screw, so that they can be taken off, sharpened, and put on with a pair of nippers by the groom without the aid of Vulcan. Horses always slip sideways, and with such a shoe upon their feet it would be quite impossible.

I also suggested, at the same time, the use of gutta percha tires for wheels, instead of iron; one set will outlast two sets of iron. I have not patented either of these inventions, but expect to see them both in common use.

By the adoption of these two improvements we may enjoy the most quiet and best paved street in the universe.

In the neighborhood of Lyons, in France, I examined the remains of a Roman military road, which was composed of masses of flint stones, about the size of a hen's egg, laid in concrete, twelve feet in depth, and notwithstanding it had been exposed to the wear of time for more than sixteen centuries, I could make no impression on it with a hammer. The Romans invariably established their roads by first ramming the soil, next by spreading a layer of flints, then a layer of concrete, composed of one part lime and four sand, then flints, mortar, &c., until the whole mass was perfectly bound together, thus they have left monuments of their good sense that will endure to the end of time.

Our thanks are due to Caius Graccus, who lived one hundred and thirty years before Christ, for teaching us how to join roads together by bridges, and also to drain them by subterranean channels, and the introduction of mile stones, which everywhere

indicated the distance from Rome to all the colonies. He erected in the Forum a standard milestone, denominated *miliarium aureum*, or golden standard, from whence proceeded roads to all parts of the empire.

Another species of Roman road was the subterranean, carried under ground for the single purpose of shelter from the sun. these grew up among the Romans in times of luxury, and vestiges of them are still to be found in many parts of Italy.

In those days stirrups were unknown, and stones for mounting horses were placed at intervals of ten feet along all the Roman roads.

Roman streets were divided into three kinds: the first, or simple *stratæ viæ*, paved roads, were formed only of gravel or pebbles; the second, or *viæ silice stratæ*, paved with flint stones of unequal but large sizes, and the third, or *viæ saexo et lapide quadrato stratæ*, paved with flat square stones regularly laid.

Notwithstanding all that has been said respecting Roman roads throughout their once immense empire, you will no doubt be surprised to learn that they cannot compare with the elaborately constructed roads of ancient Mexico, and those leading to the mighty cities of Palenca or of Colucan, seated upon the banks of the river Otulun, though upon an elevation five thousand feet above the level of the sea, and covered with almost impenetrable forests, estimated by woodmen to be nine hundred years old, there are roads far superior to the Roman prætorian, or military roads, built of immense squared blocks of stone, and with all other distinctions, in the highest degree demonstrative of wealth, skill and industry. Like our railroads, and to a degree beyond what was observed by the ancient Romans, these ancient American roads were carried along continued levels, and through tunnels, galleries, and subterranean passes, besides having aqueducts and viaducts traversing uneven surfaces, and parapeted along the edges of acclivities, with regular stations for the public posts.

Mr. J. K. Fisher—The mechanical appliances of locomotion, from locomotives and railways down to boots and sidewalks, are as far below the standard of science as they are above the standard of the last century. They involve dirt, noise, waste of time, danger

to life and limb, certain injury to health, by dust and want of ventilation, injury to clothing, furniture and goods, from dust and mud, excessive wear of carriages and shoes, an inordinate expenditure of motive power, and a wear of roadway proportioned to the expenditure of power. But the most excessive and inexcusable of all defective appliances of this kind are the pavements of cities—they exist notwithstanding that there is abundance of capital actually expended upon them, and the only cause of their continuance is the conceit of politicians, who have no idea that they know less than such civil engineers as Telford, Macadam, Macniel, and many in our own country who would have been equally celebrated, had our rulers been wise enough to employ them to direct the construction of roadways. It is therefore time that men who understand these matters should protest against the ruinous operations of ignorant and often fraudulent contractors, employed by politicians to the injury and disgrace of the community. And it is time that this institute, especially this mechanical and engineering branch of it, should act in the spirit of a liberal institution, as contradistinguished from the spirit of trade, and should exert itself to show the public what is good, and what is bad, in the structural arrangements that are necessarily under the public control. This property of the institute may be made fifty thousand dollars more valuable by scientific improvements in Broadway.

And first among these improvements is a clearly, noiseless, durable and easy pavement. It is practicable to make a pavement on which a man can draw more than a horse can draw on the present pavement, and from which no dust or mud can arise. The traction on the present pavement is not less than 31¼ lbs. per ton; but on a good iron pavement it would be but six lbs. per ton—less than a fifth; and a man has full a fifth of the power of a horse. But when we consider that the carriages might be of less than half their present weight, if the pavements were good, we can see that a man might work a carriage as easily as he works a hand-car on a railway, if no better and cheaper power were attainable. What I mean is, that all the transportation of a city paved with iron could be done by man power, without extraordi-

nary fatigue, at less than half the cost of horse-power, and at a slight expense of paving and street cleaning, and without damage to goods or clothing, from dust and mud; but of course I do not propose to adopt man power, unless it may be for very light work, in cases where there is not sufficient employment for machine carriages.

The pavement now under consideraion has the advantage of easy traction; because it keeps the wheel always up to its level; the indentations to catch the horses' corks are so small as not to allow the tire to enter them, and so disposed that a horse-shoe cannot slip more than an inch without one of its corks catching. If the tires be an inch and a half wide, it will be equal to a perfectly smooth iron floor. And yet it will afford a better foothold than any pavement now in use; there is no form of grooving, no block or cobble paving that will not allow more than an inch slip; and there is none whose upper surface is so free from liability to produce slipping, it being truly level. When surfaces are rounded, like cobble, or grooved stone paving, the feet slip more or less at almost every step, and the horse is fatigued by his efforts to keep from falling; but if the surface be truly level he never slips at all, unless heavily loaded, or made to stop or start too suddenly.

Comparing this pavement with the honeycomb iron pavings in Courtlandt street, we shall see its great superiority. That does not keep the wheels up to their level, but allows them to fall into the dirt holes between the iron points; two thirds of the time the wheels run upon dirt, with a traction of 240 lbs. per ton; and during the other third they are jolted upwards by the iron points, producing resistance from collision. The resistance must be much greater, for narrow-rimmed wheels, than it is on block-stone pavements; and, it being full of holes, it neither keeps the water out nor the dirt in, but is the muddiest pavement in the city. It has no merit but that of keeping its general level; it yields under the wheels, is never solid and firm, and much power is expended in moving it, as the wheels pass over it.

How this monstrosity ever got adopted I do not know; it is probably due to the oddity that made it patentable, to the great efforts of the company that owns the patent, and to purchased in-

fluence. I have been told, by a party interested in another iron pavement, that fifty shares of stock were given to one newspaper; and knowing that the press is governed by the laws of trade, and probably could not obtain support if it acted on liberal principles, I presume that its influence has been to a considerable extent obtained in this way.

The vast capital and influence invested in old inventions, plans fashions and practices, support the press; and if all the genius in the world were concentrated upon the improvement of paving, and should develop the absolutely perfect plan, that plan would remain unnoticed unless it paid ; while the iron paving in Cortlandt street would get all the commendation it required.

I think it proper to say a few words about the origin, present condition, and future prospects of the Russ paving, as it is called. It was to last several thousand years without expense for repairs. It has a good foundation of concrete; but between that foundation and the pavement there is a layer of dirt, which was put in to level up the blocks. Of course this dirt did not keep its place ; but allowed the stones to be driven down, so that the surface soon became uneven. The London pavements, made of large blocks, are laid upon concrete before it is set, and they keep their level perfectly ; and if this pavement had not been laid under the direction of men who were ignorant of the principles of road engineering, they would have used cement instead of this loose dirt.

A multitude of ignorant persons are now contriving plans to improve this pavement, at a cost of two dollars per yard, after paying $6.50 per yard once, for all time. Some of them think they can do it for fifty cents per yard; others dont know what it will cost; others will do it by steam drills and cutters, which they have invented but not tried; but I do not believe the grooving, perforating, or splitting up and relaying, will be done for less than two dollars per yard; and when it is done the paving will wear much faster, and make much more noise and dirt than it does at present.

The best disposition of this pavement would be to lay it in the Fifth avenue, provided the proprietors will pay a reasonable part of the expense. In place of it, a good iron pavement should be

laid. The loose dirt, or what remains of it, should be swept off the concrete foundation, and cement or bitumen should be put between the concrete and the iron.

As to the grooving, it is inexpedient. The omnibus men, who propose it, do not pretend that it will save the cost of it; they advocate it on the ground of humanity to the poor horses. But who does not know that it is better for the happiness of horses that their career should be terminated as soon as possible after they get into the omnibus service? The fact is, their proprietors, to save themselves a small amount, in loss of horses, wish to saddle the city with a loss of $20,000 a year, in interest, and extra wear and cleaning of pavement; and to inflict a greatly increased damage from dust, upon the goods and the clothing of those who pass through the street. The grooving, boring holes, ramming in gravel, and other quackeries, will do more harm than good. The true remedy is iron paving.

What form of indentation is best, is a question I don't wish to study into, not having time to spare; but Mr. Filkins' appears to be the best I have seen. I anticipate the introduction of carriages propelled by steam, compressed air, or some other more convenient, if not cheaper, agent. And these carriages will do all the work, both for passengers and goods. If this shall come to pass, grooving will be unnecessary. A good level will be ample security against the slipping of human feet; and the slipping of wheels is a question to be settled between engineers, on one side, and on the other side, the visionaries who still declare that wheels will slip if they are not roughened.

After steam has underworked and thereby superseded horses, in all kinds of vehicles, iron paving will be the only kind laid in thoroughfares and wealthy streets. Then locomotive carriages may be introduced by those who are constrained to economize; and a man may, with his hands, do the service now done by about every coach team; and his vehicle will cost a quarter as much as the present coach, that is built to resist the violence of rough and uneven pavements. You may then ride for a quarter of the present fares; and your eyes and lungs will not suffer from horse dust, or pavement dust; your ears will be relieved from noise, your clothes from mud, your boots—

Boots brings me to side-walks, which will then be of iron. There will then be no need of lofty heels; you will walk noiselessly; you will throw no mud upon your trousers. How this last named evil will be avoided depends on another improvement which I shall not here describe. But I may say that I, for several years, succeeded in getting boots made that never threw mud upon my legs. It was with difficulty that I drilled one bootmaker. But as I went abroad for some years, and could not find him after my return, I have not felt willing to undertake the labor over again; so I get my legs muddy, until I can afford to drill another practical man to pay some attention to a theorist.

What turned my attention to this improvement was a fact which I observed on my reflections upon it. A fellow student of mine had a stiff knee; his stiff leg got muddied as other legs did, in the rainy season in London; but his sound leg was always clean. I considered whether a stiff leg was better in any respect than a leg as nature made it; or whether the boots were wrong. Having implicit faith in nature, and a strong prejudice against bootmakers, on account of their distortions of the feet. I deemed it improbable that nature had made an arrangement that a stiff knee could improve; so I studied into the anatomical and mechanical principles of the matter, and designed a foot, made lasts myself, and got a pair of boots made that threw no mud, and which enabled me to walk a fifth farther in a day than I could walk in common boots.

I would also say respecting carriages as I say respecting boots, that it is improbable that nature has so arranged that mud and dust are necessary to be borne. The refined taste that exists in cultivated minds is presumptive evidence of the existence in nature of the means of satisfying that taste; and if I did not know by scientific investigation, that locomotion without dirt is attainable at moderate cost, if not at less cost than the barbarous dirty system, I should still have faith that man is not made to endure such evil forever, but has before him the prospect of all the excellence that his taste requires, in locomotion as well as in other matters.

Alanson Nash spoke of the easy making of roads by the Romans, who compelled hundreds of thousands of white slaves to do it, while in modern times, such labors by freemen are impossible, on account of the grand cost. He described the marble paved road of the Emperor of China, of forty miles, from Pekin to his country palace, 400 feet wide, magnificent trees on its margin, parallel roads outside for the people, army, &c.; walls outside of all forty feet high, of masonry, on whose tops six horsemen ride abreast, &c.

Mr. Meigs—Notwithstanding these works of despotism, modern freemen, paying fully for all labor and all material, have done more costly work on railroads, steamers, &c., than would pay *ten times over* for those almost fabulous works of other days and countries!

Mr. Tillman—Yes, Mr. President, steam. Whitney & Co. shade, in their immense works, all past efforts, pyramids and all. As to our pavements, I find on calculation that one of our omnibuses in a day's travel over cobble stone pavement receives a half million of shocks, calculated to do it much injury, as well as to the horses, who all feel those percussions more or less.

Mr. Chas. J. Shepard exhibited and explained his cast iron hexagonal hollow blocks, having the solid road surface of raised lines about one-half inch to aid the horse's hold of it. This block is exactly one foot in diameter, and four inches depth, and its inner surface cast with arched ribs to sustain pressure from above. He claims for it a stability by its compression of the stratum below it, something illustrated by the firm hold of inverted clam shells on paths.

Mr. Meigs—Or like the firm foundation obtained on loose or wet ground, by the inverted arches of our architects in their foundations!

Mr. Shepard—My plan can be executed for $6.38 per square yard. This the age of iron. I am enthusiastic on that point. We abound in it, and I am ashamed that my country sends to England for rails when she ought to furnish all that England wants. Every iron road and every iron structure in America ought to be made of American iron.

Same subject continued, and by Jos. Dixon. "Photography" also.

Adjourned. H. MEIGS, *Secretary.*

March 10, 1858.

Present—Messrs. Pell, Butler, Tillman; Seeley, Leonard, Dr. Smith, Fish, Nash, Tinelli, Marzoni, Stetson, Pratt, Judge Livingston, Carr, Chas. Clinton, of Brooklyn, Prof. Nash, Edwin Smith, Geo. F. Barnard and others—thirty-one members.

President Pell in the Chair. H. Meigs, Secretary.

Mr. Mott communicated information in relation to moulding sand, from Messrs. Titcomb & Waldron, Waterford, Saratoga county, N. Y.

We do not know whether moulding sand is found in the New England states or not, but if it is, it must be of a very inferior quality, as we furnish very large quantities to all parts of New England. Our orders extend through the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. The cost of freight varies (of course) with the place to which it is transported. The cost (including freight and sand) to inland towns, by railroad, ranges from three to eight dollars per ton; to the seaports, from two dollars fifty cents to three dollars fifty cents per ton.

The orders from New England for coarse or fine sand, suited to heavy or light castings, are about equal.

The only places in New-York State we know of where moulding sand is found, are about Peekskill, and in Albany county, both of which places are largely supplied with the article from this place, notwithstanding the extra expense of transportation. The only state west of New-York to which we know sand is shipped from here is Illinois; we having shipped a few cargoes to Chicago, via Erie canal and the lakes. The west is mostly supplied with castings from the east.

Large quantities of sand are shipped from here to the Canadas, both Upper and Lower. We have shipped some to St. Johns, in New Brunswick, which must have cost them from $8 to $10 per ton freight.

We have supplied orders from Mobile, in Alabama; Augusta, in the state of Georgia; Apalachicola, in Florida, and Charleston, state of South Carolina, and which was packed in barrels and delivered on shipboard at New-York. We have within the last year sent some lots, packed in the same manner, to California.

Philadelphia and its vicinity are large consumers of our sand. Baltimore, in Maryland, is another important point in our trade. We also send large quantities to different places in New Jersey.

The principal cities in this State, such as New-York, Buffalo, Oswego, Albany, Peekskill, Troy, Seneca Falls, Utica, and others, are supplied from here.

The cost of the sand is one dollar per ton, delivered on boat or cars. The river, canal and railroads at this point are within a stone's throw of each other. The cost of transportation varies with the season of the year, but is always governed by the rates from Troy and Albany.

The sand is deposited in layers varying from two feet to one inch in thickness, and is on elevated lands. It is not uniform, but is scattered in plots; one acre may be finely spread with it, and the next acre not a particle of it can be found. We have to strip the land of the sod and a sand loam to a depth of from one foot to two feet before reaching the moulding sand. It is in two layers, the one resting on the other; the upper layer is the fine sand and the under the coarse. Each layer is distinctly marked and separated from the other, as if deposited at different times. Under the sand is a coarse loam differing entirely in its character from the sand. The land from which it is taken is very fertile, and is devoted to agricultural uses. The qualities which give the sand its excellence are as well, if not better, known to you than to us. The many and distant points to which it is taken very clearly indicate the scarcity as well as the want and necessity of a sand suitable and satisfactory for moulding purposes.

Charles Clinton, of Brooklyn, exhibits and explains his newly invented horse shoe, in which he uses India rubber in a sort of iron case adapted to the form of the shoe.

John Carr tried his new gas burner on the gas lights of the room. He claims a brighter light from them than is obtained

from the common burners, by reason of perfect combustion, and as determined by the photometer, *with less gas.*

Mr. Tinelli, formerly U. S. Consul in Portugal, introduced Mr. Marzoni, of Lago Maggiore of Italy, the patentee of machinery for converting entire blocks of suitable wood into a pulp for paper making. Mr. Tinelli exhibited several conditions of the pulp, and several different samples of paper made from it. Some ten to twenty per cent of rags are added to the pulp. The pulp can be supplied for one cent per pound weight.

Mr. Pell read the following paper on the subject of Light: Gas is, in my opinion, far superior to any other material as an agent for giving light in dwelling houses and public buildings, for the reason that it is safe, cheap and an economiser of time. It may be lighted and extinguished in an instant, without emitting sparks to set fire to clothes, as often occurs when lamps or candles are used. Its odor, being entirely unlike that emitted by any other burning matter, constitutes a very valuable property, inasmuch as the source can be detected and at once prevented. the odor of gas is certainly disagreeable, but it is not of common occurrence in our houses or churches, and is as unnecessary as that cess pools or drains should be choked, or left uncovered. When the odor of gas is perceived, do not on any consideration enter the room with a lighted taper before the windows and doors are thrown open for a short period of time, that the gas may have an opportunity of escaping.

All those who have used gas will allow that a building thoroughly lighted with it possesses comforts and enjoyments positively unknown to those necessitated to use lamps or candles, which give an indifferent light. Gas, to be agreeable, must not be used in such excessive quantities as it usually is, there is a medium in all things, which should be observed; if you go beyond that necessary for all and every practical purpose, you do your eyes an injury, commit waste, destroy the oxygen, and overheat your apartments, all without reference to utility or comfort. If for special purposes it becomes necessary to light a house brilliantly, gas only can be used, as any other light would inevitably give dissatisfaction. If obtained from wood it will be cheap, provided

it abounds. One cord of common green pine wood will produce 129 cubic inches of gas light, fully equal to eight hundred and five pounds of wax candles. One cord of hard green wood, such as oak or hickory, nine hundred and five pounds of wax candles. One cord of dry pine wood, thirteen hundred and six pounds of wax candles, besides a residuum consisting of tar and charcoal, pyroligneous acid and creosote. In all parts of the country where coal does not abound, you cannot possibly have any cheaper light than can be obtained from any kind of wood. If wood is not abundant peat swamps always are, and by a double decomposition of its constituents, a brilliant illuminating gas, equal to coal or wood, may be obtained for less than fifty cents the thousand cubic feet. Two pounds of common peat will produce light for two hours and ten minutes, besides one third its weight of peat charcoal. It is well to recollect that the productions of combustion are exactly the same in their chemical constitution, whether the light is produced from gas, tallow, oil or wax, and at the same time that a more splendid light can be obtained from a flame of gas of the same dimensions than from lamps or candles, because the combustion is more perfect. When we use candles, or, in fact, any of the newly invented compounds for light, there is necessarily a preparatory process of vaporization, sometimes producing an unpleasant odor, which gas is not subject to.

If a building is lighted with gas, it can be far better and easier ventilated than one lighted with any other material, because the air is prevented from resting on account of the dry walls, ceilings, and furniture, and spontaneous ventilation is promoted. The moment fresh atmospheric air enters, its temperature is at once raised, and as it escapes, makes room for a larger supply at a much lower temperature. This process should be assisted by having a small opening near the ceiling of every room in the house, which may be concealed behind a picture, bookcase, or cornice, so that a continuous supply of pure, wholesome air may be admitted at all times in such quantities as may be found agreeable without creating a draft. As vitiated and pure air cannot inhabit the same locality, you have only to see that the latter is admitted, and the former will take care of itself.

When you desire to estimate the cost of gas, as compared with the light obtained from any burning fluid, wax or tallow, remember that equal quantities of light from each substance must form the basis of your calculations. As compared with the most reasonable priced lamp oil, you will find it more than a fifth cheaper, and with Judd sperm oil, nearly a tenth. In a few years we will not only light, warm, and ventilate, but even cook with gas, and it will be found a most cleanly, convenient, commercial and domestic commodity. Meat can be roasted by gas, and made to contain not only its nutritive properties, but its flavor, in greater perfection than by any other fuel. In baking it cannot be surpassed, because the heat can be regulated with the most perfect accuracy.

I have heard my friends say that gas light is destructive to the eyes. So it may be, and so will any other light be if improperly used, whether oil, turpentine, wax, or tallow. You might as well say that the light of the moon is more useful than the light of the glorious sun, as that the light from a tallow candle is less injurious than that from gas, or that it would be preferable and more congenial to write by fire light than by candle light.

Try the experiment; read for a week by the dim light of the best wax candle, and note if your eyes are not far more injured, and sight distressed, than by a month's reading by the light of a well regulated and properly adjusted gas-burner. An Argand burner, attached to a jet of gas, can only be compared, as far as the effect is concerned, to a well diffused sun beam. I would direct your attention to one fact that I have discovered with regard to gas in an Argand burner, and that is, if placed invariably above the eyes, and at a studied distance from them, it becomes more agreeable than day light, and exceedingly preservative of the sight. Wherever I have seen it used, the light is invariably brought entirely too near the axis of the eye to yield the best illuminating qualities of the gas. The angular direction must depend mainly on the size of the room, and this can be determined with greater nicety by gas than any other light.

Those persons having burning fluids, &c., for sale, say that rooms lighted by gas become uncomfortably heated; so they do,

but the heat is in proportion to the light; therefore, if you obtain the same quantity of light through the medium of candles, oil or burning fluid, you will experience the same heat. Forethought and contrivance can regulate this matter according to circumstances.

How often we hear people say our rooms were comfortable when we burned sperm candles, but now that we have admitted gas, they are excessively warm. The reason is they economised when burning candles, generally using two, and seldom four, consequently they created but little heat, and gave a like quantity of light. When gas was admitted, it was found cheap, and pleasant, each jet producing as much light as twelve candles, and corresponding heats, all of which might be avoided by the little forethought above mentioned. Use the gas with the same economy that you did sperm candles, and there will be no cause left for complaint.

In selecting fixtures, let durability, cheapness, and embellishment, harmonise with your purse, and practice economy in the use of gas, and you will be pleased with the transition from candles to it, as they are known to give off peculiar compounds of carbon and hydrogen, during their imperfect combustion, which is prejudicial to health.

It has often surprised me when considering these matters, that gas is not used instead of tallow candles in the mines of England, which cost two millions five hundred thousand dollars per annum. In Cornwall and Devon, when I was there, thirty-one thousand men were employed in the mines, below the surface of the ground, and they were lighted with tallow candles at an annual expense ot four hundred and fifty thousand dollars.

Many suppose that their ceilings are discolored by the smoke arising from impure gas, but this is a mistake, as there is no connection of any kind between the quality of gas and deposition of soot.

The smoke is caused by raising the flame high enough to form forked points, which emit it; or when lighting, the cock is opened and gas permitted to escape before lighted, the puff which follows this operation, carries a cloud of smoke to the ceiling, and as this

is of daily occurrence, a black wall is inevitable. Whereas the glasses should be taken off daily and carefully washed, and when lighted, apply the match to the burner, and open the stop cock with caution, permitting no more gas to escape than is sufficient to form a distinct ring of blue flame, then place the glasses on, and raise the flame to the desired height, about three inches. By paying attention to this simple rule, you will never be compelled to complain of broken chimneys or blackened ceilings.

Many substances have been used for obtaining gas, such as tar, rosin, fat, oil, coal, &c.; rosin and oil afford a more brilliant and whiter light than coal, because they contain a larger percentage of carbon, and their flame is perfectly free from sulphuretted hydrogen, and nearly resembles the light of wax candles, but coal being far cheaper is generally used. If coal gas is forced through pumice stone saturated with naptha, it gives a finer light than coal gas alone, and saves eighteen per cent.

Coal gas often turns white oil paint black, owing to the large quantity of sulphuretted hydrogen contained in it. This may be prevented by covering the paint with varnish.

What is light? Rays of exceedingly minute particles, radiating in all directions from luminous bodies in straight lines, and when they strike upon solid bodies they rebound. A beam of sun light, though apparently colorless, consists of seven colored rays, forming what are termed prismatic colors; but these do not produce heat. Rays of heat and light from the sun pass readily through glass, but with fire, the light only, and not the heat, pass through.

Flame is volatilized matter converted into vapor, and by heat rendered luminous. The flame of a lamp, or candle, is not solid, but a thin white vapor, surrounding a heated vapor, which for the want of oxygen is incapable of igniting; you may insert a tube into this dark centre and ignite the vapor passing through it at the opposite end. When the flame of a candle tapers to a point, there is no smoke, because the carbon is burned at the top; but the moment it flickers, and presents a red appearance at the top, the unburned carbon escapes through the flame, and gives out an abundance of smoke. Argand has remedied this defect by

admitting oxygen to the centre of the flame. The flames of different substances do not all form an equal production of light and heat. Phosphorus burns with a dense flame; sulphur a weak one; spirit of wine a slight but very powerful one in respect to heat.

The vegetable oils used for light, are olive oil, which burns with a beautiful white light, fully equal to wax, free from any offensive smell while burning, but is rather expensive. Tobacco and belladonna oils, mild and much used in Germany; Colza oil, extracted from the seeds of a species of cabbage; oil of plum stones; cocoanut oil; palm oil, from which steam is obtained; whale oil, &c. Then we have vegetable wax candles; myrtle-berry wax; mineral wax; Breckenridge coal wax; spermaceti; tallow; dipped; mould; and stearin. There are many lamps in general use, but among them all I prefer the Carcel, which gives a beautiful light—the oil is raised through tubes by clock work, in such a manner as to keep the wick thoroughly soaked; it will burn eight hours with unabated splendor.

If a lighted candle is projected between you and the sun, the wick only is perceived, which presents the appearance of a black spot. The intensity of the flame of a wax candle, is equal to the fifteen thousandth part of a corresponding portion of the sun's rays. The brightest light ever produced by man, was engendered by the aid of a galvanic battery, and it compares favorably with solar light, being equivalent to three thousand eight hundred wax candles. The direct rays of the sun are equal to five thousand six hundred wax candles, placed fourteen inches from the object, and the moon to the light of one candle at the distance of thirteen feet. The light of the sun is one million times greater than the light of the moon, and millions of times greater than all the fixed stars taken together.

The Chairman called up the regular subjects: "Pavement and photography."

Mr. Pratt desired to explain further his steam plow, which he did by drawings on the black-board and by description.

Wm. B. Leonard, for Thaddeus Selleck, exhibited his new plan for pavements. It consists of cast iron frames, two feet long and

one wide, intersected so as to contain eight blocks of wood, into which flat wedges of iron, of one or two eighths of an inch thick, by one inch and a-half wide, are driven into the blocks to the level of the round surface; about eight in each block. The blocks are six inches in length. Mr. Selleck considered that the iron wedges will lessen the wear of the wood, and will be preferred by travel to an even surface. Each case of eight blocks is readily taken up for repair; and the presence of iron in the wooden blocks, by their rusting, will help their preservation; and it is believed that they will last ten years undecayed.

Prof. Nash suggested the use of iron tubes, of two inches diameter, placed vertically, firmly, on a suitable base of iron. Gravel to fill the tubes.

Mr. Butler proposed to invert the pyramidal granite Belgian blocks, so that on a firm concrete they will stand firm, while the smaller surface filled in with gravel, forms perfect foot hold for the horses' foot.

Mr. Fisher described Neapolitan pavements, consisting of large slabs of stone, pecked sufficiently to form foot hold; somewhat after the manner of the large granite rough pecked side-walk in front of Bowen & McNamees' new marble stores in Broadway; and some other places. When the Neapolitan pavement wears smooth, they pick it over again. Under the slabs they use the softer tufa.

Mr. Tillman explained (by desire,) his plan, which consists of iron, and the several parts so united that in no case can a wheel depress one part below the other, so as to cause that injurious shock felt at every joint of railroad iron.

The Secretary observed that Mr. John D. Ward had noticed brick pavements in Holland which appeared to be excellent and durable. They were of hard burnt bricks, placed on their edges upon a firm base. Mr. Ward thinks that very hard burnt bricks set on end, and in close contact with each other, upon a firm base, would make a durable pavement, and one where horses could not slip.

Mr. Wm. B. Leonard—I prefer the solid, granite Russ pavement, on account of its great durability, and that it can be

adequately and cheaply roughened so as to make slipping impossible, and by means of machines having several vertical steel pointed stampers, which shall be regulated so as to do the roughening sufficiently, but not too deep. The machines to be operated by any suitable power. The granite pavement, with this surface will be the best pavement that has been suggested.

Mr. Charles E. Seeley exhibited and explained his Photographic apparatus. A convenient, adjustable three-legged stand, which closed forms a sort of walking cane, with a stand platform of suitable size, (to support the camera) which is readily taken off and carried. Gutta percha pans, very conveniently lipped at one corner, for pouring off the liquids. Some fine photographs—one photolithographic likeness of Mr. James A. Cutting, photographer. Mr. Seeley believes that we shall soon make photolithographic printing, &c., immensely superior in facility and amount to all known methods.

Types, and Dr. Faustus & Co., will go to oblivion.

IRON AND STEEL.

Mr. Meigs—Although used by man more than almost any useful thing whatever, although it is worth more than all other metals, although it may be stated that millions of ingenious men have eagerly sought for best iron and steel for several thousand years, yet our scientific publications teem with new plans, as if now it was first known how to make iron from its ores, and steel from the iron.

The American Mining Chronicle abounds in these new attempts to improve on all former processes. We know that in India, in Syria, in Spain, and many other countries, steel of most admirable quality has been made at least, (in some of those countries) three thousand years! The sword blades of Damascus and of Seville, are bent heel to point, without alteration in them!

It is true that iron is sadly mixed up, chemically and mechanically, with some material or other usually foreign to its purity; yet why has not experience, so immense, discovered what the foreign element is, and communicated it? It is well known that those spurious elements are few in number, however variable in

quantity. Why not try first to regulate one of them—silex or alumina, for instance—determine one forever by a suitable process, then another, and so on. Chemical and mechanical tests can be made to show when the element silex is right. When that is decided positively, try other impurities. In chemical analysis we are obliged to separate one element first, and so on.

Next meeting, subject, "Photography."

The Club adjourned.

H. MEIGS, *Secretary.*

March 24, 1858.

Present—Messrs. T. B. Stillman, R. L. Pell, Tillman, Haskell, Judge Livingston, Stetson, Prof. Nash, Seeley, Johnson, Dixon, of Jersey City, Timpson, Geissenhainer, Cohen, and others—twenty-eight members in all.

Thomas B. Stillman, late of the Novelty Works, in the Chair.

Henry Meigs, Secretary.

The Secretary read his translation of the letter from Baron Von Humboldt, thanking the Institute for the present of volumes of our Annual Transactions. Dated Berlin, Feb. 25th, 1858.

The subject of Photography being called up, Mr. Pell remarked, That Photography, or Heliography, is an art, by which we are enabled, through the medium of light, to obtain not only accurate, but splendid representations of objects. So early as 1803 it was known that nitrate of silver would become dark under the sun's rays, but no mode could be discovered at that period, either by Wedgewood or Sir Humphrey Davy, to fix the pictures after they were obtained. Consequently they abandoned the experiments.

In 1827 or '28, pictures were exhibited at the rooms of the Royal Society in London, on glass, produced by light, the work of a Frenchman by the name of Niepce, who afterwards went into partnership with the celebrated Daguerre, and I suppose was entitled to a portion of the honor, which was never awarded to him, of discovering the process of silvered plates.

In 1839 Talbot discovered the action of light upon the salts of silver, and shortly after was successful in the preparation of photographic paper, on which he was able to fix designs.

In 1841 he had so perfected the sensibility of paper, as to enable him to obtain a patent, on what he called Calotype, which has been changed to Talbotype; other processes on paper have been called Energiatype, Chromotype, Authrotype, Amphitype, &c.

France and England are now equalled by America in paper Photography, and it is used for illustrating books, printing, &c., almost as successfully as upon metal plates. Chemical science can make but little more improvement, except in the preparation of material to work upon, and this will be chiefly paper, as glass and other substances are apt to produce false shade and light.

The selection of paper is of vast importance, particularly for portraits; when selecting hold against a strong light, and choose sheets free from iron stains, dust, or, in fact, any impurity, and neither too much or two little glazed. Stop up with white wax all the capillary punctures, so that it presents the appearance of parchment, at the same time only filling the texture of the paper, which the iodide of potassium most thoroughly penetrates and also decomposes any greasy particles that may be in it, and if when dry it presents a violet color, it is fit to take positive proof.

When exposed in the camera an exact focus must be obtained, and when the image appears distinct and clear in every part stop, and depend upon your experience for the necessary time of exposure to the light, recollecting that upon this depends the beauty of your picture. You must know the temperature of the slate on which you have the prepared paper, as well as that of the lens, both of which should be equal, otherwise a vapor will prevent the formation of a perfect image. White linen of some sort, being a non conductor, should be placed over the camera, so that the rays of light may be reflected without adding to the heat of the box. The picture is developed by a succeeding operation with gallic acid, properly dissolved in distilled water. To fix the negative, plunge your proof into a hyposulphite bath, which will take up the salts of silver without attacking the gallate of silver, upon

which we depend for the black to form the dark parts of the picture; this operation requires great attention, as the black may be much enfeebled by a prolonged bath. The hyposulphite must be afterwards disengaged by numerous washings in several waters; then suspend it from a corner to dry, and if you have been successful, the proof cannot be changed by light, because the black gallate remains fixed in the paper.

When you desire to take a view, be sure and have your perpendicular lines perfectly true, and do not on any account make the image unnecessarily large, and if you would have a picture free from fault, let the distance from the object you intend to copy be about one quarter of the entire scene. You may take the whole with one lens, if you use half plate size, and I would prefer to be near rather than far from the object, as it requires a shorter period of time in the camera. The image will not be clear and satisfactory if the rays of the sun strike upon the object glass.

There is a great difference in the lens; many are clear in the centre, but indistinct at the edge, where it is absolutely necessary they should be clear. Frequently the chemical focus does not coincide with the visible focus.

Double achromatic lenses are necessary when portraits are to be taken; they centralize light, and are rapid in their operation. Those made in France by Messrs. Lerebours are admirable; they are so arranged that a diaphragm may be attached, which makes the objeet very clear.

Nine out of ten operators, when taking a portrait, place the shoulders and head in the same position, showing a great want of taste, as one side should always be more illuminated than the other to make an interesting picture. Another fault is, that the hands and knees are rarely in focus with the face; this may be easily obviated by a little calculation. The light should never reflect into the camera at right angles.

Pictures may be taken in the camera by means of collodion on glass. This preparation is a solution of gun cotton in ether, with a small portion of iodide of silver dissolved in iodide of potassium.

By this method, men walking, water rippling and ships sailing may be readily taken in six seconds.

The reproduction of colors from nature by light have been produced by a native American residing in Ulster county, by the name of Hill, but as is usual, his invention has been claimed by a Frenchman known as Niepcé de St. Victor, son-in-law of the original discoverer of the Daguerreotype in connection with Daguerre. Colored prints have been produced by using chloride of stroutian for the red tints, chloride of calcium for the yellow, chloride of nickel for the green, ammonia and chloride of copper for the blue, sulphate of copper and chloride of strontian for the violet. All these substances will color flame; those which will not do not act in the sun's rays. These pictures will not last long unless they are varnished, and placed where there is not a strong light. If your picture is varnished you must examine it with one eye only, as the varnish has the effect of reflecting the light which falls upon it to each eye when they are both used, and from objects in all parts of the room. By closing one eye you shut out much of the reflected light, and the mind is enabled to contemplate the picture with one half of the disturbance; this rule holds good with regard to all varnished pictures. If your gallery has side lights one eye must be closed; if both are used the sensibility to the rays of red invariably give a false coloring.

In fact, all photographic pictures should be examined with one eye; because they are on a plane surface, and one eye makes it appear as if the objects were in relief; of which there are three kinds in Daguerreotypes and photographs; ocular when both eyes are used, monocular, one eye; and binocular, as in the stereoscope. When we look into this latter instrument, a different picture is displayed on the black substance in both our eyes, and our mind immediately combines the two flat pictures into one, giving them the solid form they present. If two pictures of different sizes are placed in the stereoscope, the mind forms them into one of an intermediate size; and if two of different colors, it is impossible for the mind to combine both; the eye sees the brightest first.

If there happens to be a bright scarlet object on the picture,

our eyes are affected by undulations, recurring four hundred and fifty millions of times in a second. And if yellow, five hundred millions of vibrations must occur before we can appreciate it. To discriminate violet, seven hundred millions of movements are communicated to the fibrilla of the retina. A white substance on a black ground 1,400th of an inch square, may be distinguished with the naked eye, without certainty. But particles which reflect light, such, for example, as gold dust, of the minuteness of a millionth part of an inch, may be plainly discerned with the naked eye. If there is one minute particle in a picture that cannot be discerned, make a short row of them and the eye will distinguish them immediately; showing that the delicacy of human vision is much greater for lines than single particles.

When you enter a picture gallery, you imagine that you behold all the pictures at once, not being conscious of the motions of the eye; when, the fact is, each picture is successively presented to it with the rapidity of lightning. If the eye were steady, objects would disappear. Try the experiment; fix your eye on a single picture, which is a hard thing to do, owing to its disposition to motion, and you will find that it will first become obscure and then vanish. The reason is, the retina of the eye is subject to fatigue by the colors, lights and shades of objects striking upon the same parts, and thus exhausting the nerve, which actually requires constant exercise. The eye catches red more rapidly than any other color, as is instanced in battle; twelve soldiers wearing red will be shot, when only seven wearing green, six brown, five Austrian gray. All photographic effects are, no doubt, the effects of a very high temperature. Whenever a ray of light impinges on any point, it raises its temperature to the same degree as the source from whence it springs. If it were not so, the images would not be sharp on their edges.

On the 7th of May, 1857, Mr. Bond, the eminent astronomer of Boston, established by successful experiments, that stars down to the fifth magnitude, or in other words, "all stars usually visible to the naked eye, may be mapped by the aid of photography with a degree of accuracy unsurpassed by the most refined measurements; this was proved by measuring the distances of the pho-

tographic images taken on different nights. For this success he is indebted to an improved driving clock regulated by a pendulum and daguerreotype plates of increased sensibility, both the work of Boston artists. This means of making the heavens map themselves, will facilitate the detection, of the minute changes of position among the stars, which has within a few years quintupled the number of known planets, and produced so many other discoveries."

"Mr. Peazzi Smith, made some photographical researches in 1856, in Teneriffe, and he found that the intensity and power of those pictures taken at ten thousand seven hundred feet above the level of the sea, were eminently greater than those at eight thousand nine hundred feet, and those again were far superior to those at the sea level. Further still, he found remarkable facilities in the upper regions of the atmosphere for procuring the detail of distant objects. Thus, over and over again, at ten thousand seven hundred feet, he obtained on the Collodion plate the bushes, stratification, and even the clearage of the rocks, forming a chain of mountains four miles distant. But at the level of the sea, with a similar range of mountains, and at the same distance, and trying it when to the eye the sun was vigorously bringing out the marking of the ravines and the clefts of the rocks, he could never get anything but the outline of the mountain, filled up by an even tint."

The Liverpool photographers, think the American photographic pictures of the moon a failure. Mr. Warren De la Rue, has exhibited to the Astronomical society of Liverpool, some beautiful photographs of the Moon, and Jupiter, and at the same time Mr. Bond's photograph of Ursæ Majoris, and the Transit of Lyræ. And the Astronomer Royal was pleased to say, that the most cordial thanks of astronomers were due to Mr. Bond, and to the professional amateurs, Messrs. Whipple and Black, by whose perseverance this object had been obtained.

Mr. R. Price, of Worcester, Massachusetts, has patented a process of photographing on wood, in lieu of drawing by hand, which has since been so far developed as to be pronounced successful by some of our best engravers. The surface is so prepared as to be

sensitive to light, like the glass or paper employed in the ordinary photographic processes, and the image of any object is thus impressed upon the block with greater accuracy than it is possible to accomplish by human skill. So say those interested, but I doubt it.

Can any plan be devised of remedying the evil caused by froth in many fluids used by the photographer, even when they are viscid?

Can photographic paper be prepared of materials so pure as to be entirely exempt from metallic dots, holes, or blemishes of any kind, of one thickness, and both sides similar?

Monsieur Niepce De St. Victor, communicated to the French Academy of Sciences, on the 16th of November last, a new and remarkable photographic phenomena, to wit: that any body, after having been exposed to light, retains in darkness some impression of this light. Monsieur Niepce remarks: the phosphorescence and the fluorescence of bodies are well known; but I am not aware that any experiments have ever been made on the subject which I am about to describe.

Expose to the direct rays of the sun, during a quarter of an hour at least, an engraving, which has been kept many days in obscurity, and of which one half has been covered by an opaque screen; then apply this engraving upon a very sensitive photographic paper, and, after twenty-four hours contact in darkness, we shall obtain, in black, a reproduction of the white parts of the engraving, which, in the process of insulation, has not been sheltered by that screen.

If the engraving has been kept for many days in profound darkness, and we then apply it upon sensitive paper, without having previously exposed it to light, it is not reproduced.

If an engraving is exposed to the rays of the sun, for a very long time, it becomes saturated with light, and the intensity of the impressions obtained by contact in darkness, is so great, that eventually proofs of sufficient vigor to form an original, from which impressions may be taken, will be made; thus giving us an entirely new mode of reproducing engravings.

If, after having exposed an engraving to the light during one hour, we apply it upon a white card which has remained in dark-

ness during some days, and if, after having left the engraving in contact with the card during twenty-four hours, we put the card in its turn in contact with a leaf of sensitive paper, we shall have after twenty-four hours of this new contact, a reproduction of the engraving.

When a tablet of black marble, lightly strewn with white spots, after having been exposed to the light, is applied at once to a sensitive paper, the white parts of the marble only will be imprinted upon the paper.

When a black and white feather has been exposed to the sun, and applied in darkness to a sensitive surface, the white parts alone imprint their image.

The feather of a parrot, red, green, blue, and black, has given scarcely any impression, acting as if the feather had been black. Experiments have been made with textile fabrics of different natures and of various colors. The following are a few of the results:

Cotton—White, impressed the sensitive paper.

" Brown, (by madder and alumina.) Nothing given.

" Violet, (by madder, alumina, and iron.) Scarcely anything.

" Red, (by cochineal.) Nothing.

" Turkey red, (by madder and alum.) Nothing.

" Prussian blue, upon white ground, is the blue which produces the best impression.

" Blue, (by indigo.) Nothing.

" Chamoois, (by peroxide of iron.) No impression.

Linen, silk, and woolen cloths give equally different impressions, according to the chemical nature of the colors. Mr. Niepce says:

" If we take a tube of metal, of tin plate, or any opaque substance, and close one end, and cover the interior with white paper. Then expose the open end for an hour and ten minutes to the sun's rays. After which place the open end on a sheet of sensitive paper, and let it remain in that state for one day and night, the image of the circumference of the tube will have been designed. More than this. If an engraving upon China paper is interposed between the tube and the sensitive paper, the same

will be reproduced by the radiations which have been absorbed, and re-developed from the interior of the tube."

If we close the tube hermetically as soon as we cease to expose it to the light, we shall preserve, during an indefinite time, the faculty of radiation, which the insulation has communicated.

Keep a piece of card sometime in darkness, then place it in a camera; obscure for three hours, and on it project an image illuminated by the sun; then apply the card to sensitive paper, and after twenty-four hours there will be a reproduction of the primitive image of the camera-obscura. Monsieur Niepce has made several experiments with substances possessing the quality of fluorescence. For example, he traced a design upon a sheet of white paper with a solution of sulphate of quinine, which is one of the most fluorescent bodies; the paper was then exposed to the sun, and subsequently applied to the sensitive paper. The fluorescent parts were reproduced in black, much more intense than that of the paper upon which the design was formed. A plate of glass interposed between the design and the sensitive paper prevented any impression. Trace a design with phosphorus upon paper, without exposing it to light, and it will impress sensitive paper. This is due to the formation of phosphide of silver.

Mr. I. Mercer describes a new process, by Calotype, in which the agent employed is the peroxalate of iron, when, by the subsequent application of different re-agents, photographic pictures of the most varied and even brilliant colors are produced.

Mr Joseph Dixon, of Jersey City—Mr. Hill has long pretended to obtain the natural colors by the camera. Some approximations only have been gained, the general tints not gained; and so far Mr. Hill has played the part of that distinguished insect, the *humbug*. He has been offered a fortune for the invention if true. He could have received for it one hundred thousand dollars at any time.

Mr. Seeley remarked that the extent of Mr. Hill's colors on metallic plates was red, green and blue, but on the whole Mr. S. thought the term humbug the true one.

Subject for next meeting, "Photography and Light."

Adjourned. H. MEIGS, *Secretary*.

April 14, 1858.

Present—Messrs. Stillman, Pell, Nash, Johnson, Tillman, Cohen, Seeley, Bell, Chambers, Livingston—41 in all.

Thos. B. Stillman in the chair. T. D. Stetson Secretary, *pro tem.*

Mr. Johnson offered the following resolution:

Whereas, There having been, and still exist, doubts as to whom belong the rights or claim of the first application of Daguerre's discovery for the taking of likenesses from life. Therefore, resolved the chair appoint a committee of three to investigate and report thereon; and that said report be read before the American Institute at its coming Fair, or at an earlier day if practicable.

Mr. Tillman wished the resolution to lay on the table for the present.

Mr. Seeley spoke of the claim of Dr. Draper, of this city.

Mr. Johnson explained at length, Wolcott and Johnson's operations in 1839, 1840 and 1841.

Mr. Tillman thought Dr. Draper dated back to 1840, with the use of Bromine. Moved a committee to examine and report on the original photograph.

Mr. Chas. A. Seeley described Pretche's process and photolithographs. Thought Bromine was introduced by Dr. Goddard, of Philadelphia, early in 1840.

Mr. John Johnson said Mr. Cornelius, of Philadelphia, was a very early operator in the art.

Mr. Tillman called on gentlemen acquainted with the subject to give their views.

Mr. Seeley called on Mr. Snelling.

Mr. Snelling said neither Mr. Morse nor Dr. Draper were willing to claim priority in the Daguerreotype art.

Mr. Tillman wished the *Ambrotype* discussed, or rather explained.

Mr. Johnson said his partner, Wolcott, experimented, and produced ambrotypes in 1840.

Mr. Burgess was in Paris in 1840; learned the process; learned there that portraits were taken in New-York. He sat fifteen minutes in the sun with very poor success. He used Bromine in 1842; it was old then.

Mr. Snelling saw a good group of eight as long ago as 1844.

Mr. Johnson said it took much longer in London than here.

Mr. Seeley said in February, 1840, Prof. Morse and others met, and the Professor was surprised at the success of Mr. Wolcott.

Mr. Johnson said images of the *sun* could be taken by this art, and be overdone as pictures always are of very bright objects, and be then restored by a process he had previously described of exposure to vapors before fixing.

Mr. Stetson asked how quick pictures could be taken.

Mr. Cady took instantaneous pictures some years ago by a well-known process, but he was not the first.

A gentleman exhibited a picture taken by artificial light in thirty seconds.

Mr. Shepard thought Mr. Martin of Paris took, instantaneous, objects of all kinds.

Mr. Tillman thought Dr. Draper deserved much credit for experiments on light.

Mr. Johnson showed a letter dated 1841, alluding to a rumor that Daguerreotypes had been taken very quick, and by gas light.

Mr. Seely commended Dr. Draper as a great teacher, lecturer and writer. The time he said could be reduced indefinitely by enlarging the aperture. Prince Albert, he added, had taken pictures and attended meetings of artists in this line.

Mr. Tillman said photography was retarded in England by the existence of the Talbotype patent, and by the high price charged for the right.

Mr. Jones read a sketch from the London Athenæum, on bottled daylight.

Mr. Stetson asked why portraits cannot be taken instantly.

Mr. Burgess said pictures can be taken instantaneous only in sunlight.

Mr. Tillman said the art must ultimately advance until portraits can be taken thus.

Mr. Johnson concurred.

Mr. Seeley concurred; he also thought M. Neipce St. Dennis, of France, had done little if any more than had been done in making light latent. Many years ago pictures, he added, could be enlarged to any extent desired.

Mr. Anthony said pictures could be enlarged *ad libitum* by the solar camera. He doubted the practicability of a Photographic Society here. People have too little leisure.

Mr. Burgess thought pictures could be "printed" from a negative in from three to fifteen minutes, at a cost of from three to six cents.

Messrs. Stetson, Cohen and Seeley were appointed a committee to serve on the duty alluded to early in the evening. The question submitted to this committee was, on motion of Mr. Seeley, amended by substituting the following:

Mr. Grant thought the Photographic Society should be formed by amatuers. He said an average of three minutes three seconds now sufficed to take and finish pictures. The first instantaneous pictures were in 1853.

The question for the next meeting was announced to be "The Economy of High Pressure Steam."

Adjourned. T. D. STETSON, *Secretary pro tem.*

April 28, 1858.

Present—Thomas B. Stillman, Chairman, Mr. Haskell, Mr. Johnson, Mr. Seeley, Mr. Cohen, Alanson Nash, Mr. Fisher, Mr. Reynolds, Mr. Stetson, and others—about thirty in all.

Secretary Meigs being unwell, Mr. Haskell was appointed Secretary pro tem.

Mr. Nash offered the following resolution, seconded by Mr. Cohen:

Resolved, That the Secretary and the presiding officer of the Club be authorised to make the official report of the proceedings

for publication in the Transactions of the Institute, and that members who participate in such discussions deliver to them concise written papers of their remarks. Carried.

Mr. Johnson read a letter from Mr. Jonathan Amory, of Boston, presenting his pamphlet on steam for consideration. He has many years' experience on that subject.

Mr. Wm. A. Garbett, of Roxbury, presented an improvement in locomotive boilers. Referred to a special committee to be appointed by the Chairman.

The Chairman called up the regular subject:

ECONOMY OF HIGH PRESSURE STEAM.

The Chairman remarked that high pressure steam works best at the pressure of 100 lbs. per square inch.

Mr. Stetson—They use very high steam on our western waters, even as high as 1,000 pounds per inch, but heating steam very high destroys its expansibility. For instance 1,200 degrees, and the water red hot, do not answer. Let us take but a short step and say truly, that he who can produce an engine which will save but one per cent of steam, will render to the world a great service. He then explained the economy of the several steam cut offs.

Mr. J. K. Fisher observed that Jacob Perkins worked steam at a pressure of 1,500 *lbs. per square inch!* He explained Wolf's & Perkin's arrangement of cylinders, and cut off. He approves some of the cylinders now in use, for two for each propeller, using high pressure steam, and by an exhaust, using that steam twice.

Mr. Reynolds could not discover the propriety of that two cylinder and exhaust arrangement.

Mr. Cohen—How can the pressure be kept at 6 lbs. in the receiver?

Mr. Fisher said it would vary according to different arrangements of the cut offs.

Mr. Reynolds—In the boats on St. John's river, there are two cylinders used with economy, less steam but more steadiness.

Mr. Stetston—If steam is worked at one pressure throughout the entire stroke, the engines may be made lighter—a principal advantage of very high pressure and expansion.

Mr. Leonard remarked that the crank and shafting pins, &c., were in size and weight proportioned to the velocity with which the parts were moved.

Mr. Pell made the following remarks on the advantages of the High Pressure Engine, and principal objections to it:

First we will consider the advantages. They are infinitely more simple than the low, and in proportion to their power are smaller and of less weight, consequently less costly, and less expensive to maintain in action, are more compact, and require less room. The cylinder is smaller in diameter for an equal power; and the length of stroke may be less, condensation not being required, the velocity of the piston is greater, which diminishes the weight and dimensions of the fly wheel, and the heavy apparatus of the condensing engine is not required in the high-pressure one. The air pumps, hot and cold water pumps, are dispensed with, as well as the expensive arrangements for condensing water. Many pistons and valves requiring constant attention to keep them tight, are unnecessary in the high pressure engine; saving materials for packing and lubrication. The various parts are less clumsy, and the engines necessarily more portable, and their erection becomes more easy. This latter qualification has caused their exclusive use for locomotives, and is the reason why Mr. Fisher uses it in his steam carriage.

It may be as well to state that the above enumerated advantages apply solely to the engines, and do not refer in the same degree to the boilers. The dimensions of these do not follow the smaller size of the cylinder in the same proportion; but as a smaller quantity of water is required to be evaporated, they have their advantages when properly constructed. Another great advantage is that the high-pressure engine sustains much less loss from friction; it does not require the constant supply of cold water, necessary for condensation, which is an immense advantage in warm climates, where it is difficult to obtain water sufficiently

cold for efficient condensation. High pressure engines demand great accuracy in fitting the joints, that they may be steam tight, yet they possess the advantage that leaking is sooner discovered in them than in low pressure engines. The usual practice in high pressure engines of blowing through at starting, by which both time and steam are lost is unnecessary, and should not be resorted to, as the pressure of air in the engine, is rather an advantage than otherwise, as when expanded by the heat, it serves to assist the motion.

The use of high pressure steam, allows a temporary augmentation of the usual power of the engine by slightly increasing the production of steam in the boiler. All the parts are constantly in readiness to receive and apply a higher pressure of steam. It is not so with the condensing engine, as the condensation is only adapted for a certain quantity of steam at each stroke, and if a larger amount were to be thrown in, there would be an imperfect exhaustion of the cylinder, which would neutralize any attempt to increase the power of the engine, by an augmented pressure of the steam. It is on this account that the high pressure engine is invaluable for locomotive purposes. Mr. Gurney proposed to use in the boilers of his locomotive carriages, steam of a high pressure, which was wire drawn to two or three atmospheres in the engine by a diminution of the opening of the throttle valve. When therefore he wished to increase the power of his engine, he opened this valve a little wider, by which means he proposed to adapt his engine to overcome the ascent of hills. This plan of wire drawing the steam is considered a favorable one in regard to economy.

The high pressure is more economical in fuel, which advantage is developed partly in the generation of high pressure steam, and partly in consequence of its more suitable application to its purpose in the machine itself. The Americans have positively determined this important but doubted fact. If we could supercharge steam with free caloric in an engine, much economy would result. It is difficult to do this without destruction to the packings and other working parts of the machine. The peculiar economy of the high pressure engine arises from a more suitable application

of the steam to its purpose in the engine itself, on the following grounds: Steam finds less resistance to its action in this engine, for, on account of the great pressure, its motion to and from the cylinder is more free and rapid than in the condensing engine. One half of the total power of the steam absorbed in the condensing engine, or out of seventeen pounds total pressure, only seven pounds are made available for useful effect; while with the high pressure engine, properly constructed, only one fourth need be so consumed. The use of the high pressure steam allows the principle of expansion to be carried to a greater extent than in the low pressure engine, without requiring the dimensions of the cylinder to be greatly increased. Watt could not carry out this principle in low pressure engines, and Woolf, who re-introduced it, used high pressure steam in his engines. Steam acts in a positive manner, and is not robbed of all that valuable portion of heat which in the low pressure engine is lost by condensation. On this account, steam, from a high pressure engine, may be used again for many purposes, such as warming the feed water before it enters the boiler; for the purposes of cooking, heating buildings &c., free of cost.

Steam, at a high temperature, is more exposed to condensation than when at a lower degree of heat, since the transmission of caloric from one body to another is quicker, as the difference between their temperatures is greater. I think I have shown a great advantage to be derived from high pressure steam; considered in respect to the economy of its production, and that the advantage increases with the pressure employed.

The principal objections against it are: First, it is asserted that vessels, whenever high pressure steam is generated and contained, must be more liable to burst, than such as are used for low pressure.

This proposition seems intelligible and self-evident to those unskilled in such matters; yet it is only true in a qualified sense. I would ask whether high pressure boilers have been found more liable to explosion than low pressure.

No instances have ever occurred where a destructive explosion has happened to the engine itself, even to those worked to the

highest pressure. The steam cylinder and valve boxes, are the only parts of the engine exposed to the action of the steam; and they have invariably been found secure and durable. They are not exposed to any destructive agency, except the friction of the piston and valves; and this being almost harmless, they remain in a state of safety without deterioration.

The boiler of the engine is the only organ exposed to mischief, and with this alone explosions are found to occur. Who will then have the temerity to assert that only high pressure boilers are subject to danger, and that low pressure ones are secure.

Every boiler may become surcharged with steam when the quantity drawn off is less than the quantity generated, and when safety valves do not perform their duty, therefore as similar safety apparatus are used for both high and low pressure boilers, they are both liable to similar interruptions in their working. If, then, an over-filling of the boiler with steam is equally possible in both high and low pressure engines, both are liable to danger from this source. It will be found that as great a proportionate number of low as high pressure boilers have exploded in England, America and France. The high pressure has an advantage over the low in that the sediment (which is a bad conductor of heat), when the elasticity is great, seldom attaches itself firmly to the boiler, but collects in a loose state and is easily removed. Explosions occur from shortness of water in the boiler; when added, the glowing metal being suddenly covered with water, generates steam instantly and bursts. Both iron and copper generate, when red hot, a large quantity of steam. Ten pounds of copper, heated sufficiently to glow in the dark, convert, according to Adam Hall, one pound of water into steam, which will occupy twenty-seven cubic feet. According to Marestier four pounds of red hot iron will convert one pound of water into steam.

Professor Johnson, of Philadelphia, found that iron, at a white heat, repelled the water, and that nine pounds of iron, at a dull red glow, scarcely visible by daylight, converted one pound of water into steam. He also remarked that cast iron generated more steam than hammered iron, in the propertion of nine to eight and a quarter. Boilers should never be constructed of cast

iron, as this is a rotten and brittle material, and becomes blistered in casting and is liable to sudden fracture. Copper is better than iron for this purpose, but having less cohesive power than iron, a greater thickness of metal is necessary to produce an equal strength. Copper never flies when the boiler bursts, but merely tears asunder and causes far less destruction. Boilers should, for many reasons, be cylindrical, and have spherical heads. This form withstands internal pressure best, the strain being equal on all points of the circumference. Sometimes we see fire-tubes of a prismoidal form introduced into high pressure boilers, a plan fraught with the greatest danger. Boilers are generally of too large a size. The greater the contents of a boiler, the greater surface it must offer to the pressure of the steam, and the greater consequent danger it must be subject to. It is customary to give to boilers of great size a proportionate thickness of metal, but this does not help the case much, for experience has shown that thick plates, especially of cast metal, are more liable to crack by the action of fire than thin ones, because the temperature of their too sides, exposed to fire without and water within, does not quickly assimilate, whereby unequal expansion and contraction ensues, and thick vessels tend more to retard the transmission of heat to the water than thin ones, which fact seems to have escaped the notice of engineers. Another objection against the high pressure engine is, that in the use of high pressure steam much heat is wasted, and consequently a greater expenditure of fuel is required than for low pressure. The fallacy of this opinion has been fully shown, not only in our country but in France. A current heated as high as 400 degrees Fahrenheit is necessary to produce a sufficient draft in most chimneys; low pressure engines must then be subject to a greater waste than high pressure, in order to secure the draught in the furnace.

Mr. Christian, of Paris, to whom we are much indebted for many researches in the theory of steam, found that equal quantities of water were evaporated in equal times, by the same fire, under various pressures and temperatures. Engines will work with the least consumption of fuel when the throttle valve is almost closed, as it raises the pressure in the boiler higher than

usual, and they work more economically when fully loaded than when working under power. Another objection raised to high pressure engines is, that in consequence of the great pressure, there is more leakage of steam at the piston and joints of the engine, than with low pressure. In answer to this it may be stated that the joints are of much smaller dimensions in the high than the low pressure engine. The third objection raised to high pressure engines is that they do not realize the advantages of the vacuum obtained in condensing engines. This objection loses in weight, because the surface of the piston becomes proportionately less as the elasticity is increased, and therefore the loss of the vacuum is less to be felt.

The fourth objection is, that a greater consumption of oil and grease is required for lubrication of the piston, piston rod, and valve apparatus, than for engines of low pressure. This objection is sometimes enhanced by the assertion, that the grease becomes volatilized at the temperature of steam of very high pressure.

Now it is well known that animal as well as vegetable fat only boils at a temperature of 220° Reaumur (527° Fahrenheit,) and does not, like water, volatilize at a heat under that of ebulition. It can scarcely be perceived how any loss can take place by volatilization in engines working up to ten atmospheres; where only half the above-named heat exists; and this pressure should never be exceeded, even working up to forty atmospheres; not the eighth part of what is necessary for low pressure engines is required. A high pressure engine requires much less lubrication for the packings of the piston and piston rod than a low pressure one.

All boilers should be constructed in such a manner that if they explode they may not be dangerous; this condition has been approximated by the invention and application of tubular boilers; but they are seldom used for low pressure steam, being particularly adapted for high pressure; the higher the pressure, the smaller are the bubbles of vapor, and the easier their transmission through the water. When, after a fire is lighted under a high pressure boiler, the water first begins to boil, the steam is

formed under a low but constantly increasing pressure ; and under such circumstances, the volume of the steam produced, and the consequent ebullition, are much greater than when the full pressure is attained, caution should be employed in firing while getting up the steam, especially when the tubes are small. If the fire is at first made too strong, the water will be driven out of the lower tubes. When the pressure has attained its proper height, the fire may be increased without fear, and the water will resume its steady and accustomed level.

The great defect of almost all tubular boilers is the difficulty of cleaning them.

Subject of next meeting—" The mode of setting boilers and steam engines in general practice."

The Chairman appointed the following special committee on Mr. Amory's boiler and furnace, viz : Messrs. Stetson, Reynolds and Çohen.

The Club then adjourned.

M. HASKELL, *Secretary pro tem.*

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